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AUGUST 1986

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NUMBER 11

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Soft in the Head

THE SOFTWARE MARKET IS NOW ENtering the quiet season of the year, but having said that, there are still a lot of interesting products finding their way to the shelves of your local computer store.

Going Cheap

BUDGET SOFTWARE IS ON THE UP and up. Firebird has recently been proud to announce that it is the first software company to have its products simultaneously at number one in the UK (Gallup) and the Staes (Billboard).

The two products which helped to achieve this acolade are *Thrust*, a game in the Firebird silver range, and the now famous title, *Elite* which has at last made it to the top in the US at the reasonable price of a mere $29.95.

Firebird has now announced a new set of budget titles, which, it is claimed, "are available to every confectioner and newsagent in the country". These include one game for the C64/C128, *Caves of Eriban*, and two for the C-16, *Runner* and *Shark*.

Another Firebird offer is the Silver Club, which enables you to purchase a £1.99 game of your choice and with it you receive a package of goodies and a newsletter.

Not to be outdone, Mastertronic is releasing some new games for Commodore machines.

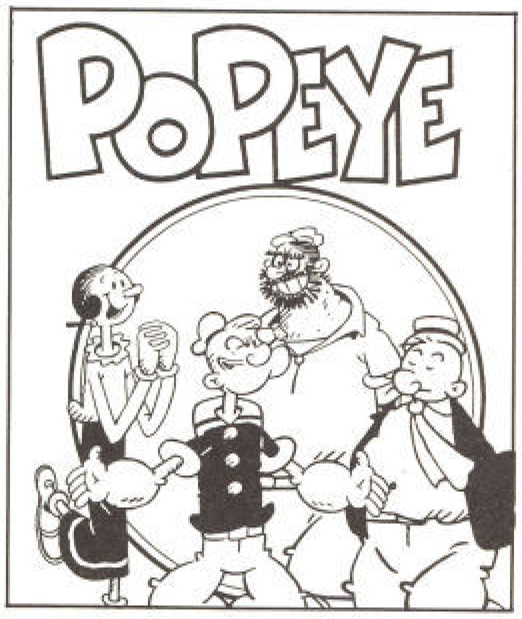
In the £1.99 range are two titles. Firstly, a volleyball simulation entitled, *Bump Set Spike – Double Volleyball.* Attributes of the game include: crowd applause, professionally composed music, choice of courts (beach or indoor) and nine difficulty levels.

Those who are interested in sampling the high life of the professional gambler may like to go for *Vegas Poker*, also £1.99 and for the C64.

Two titles now available on Mastertronic's £2.99 MAD label are *Countdown to Meltdown* and *Ice Palace*. The former involves the now tragic scenario of an accident at a nuclear power plant and the latter enters the land of fairy tales to bring you face to face with the wicked Ice queen.

CRL's budget lable, Alpha-Omega, has recently launched a new Commodore title, *Jet Strike Mission*. The game is a combat flight simulator where your task is to avoid enemy air and ground attacks and seek out and destroy the target. The price is £4.95. Yes, it is on the budget label.

Out of the Arcades



A NEW VERSION OF POPEYE, THE computer game, has been released at £7.95 by Macmillan Software. The game deals with the classic situations which the spinach munching hero daily encounters in his attempts to protect his rather ineffectual girlfriend Olive.

Popeye has recently returned to the public eye on TV-AM every day and Woolworths is about to launch a new range of Popeye clothes. If you want to join in this new exciting craze maybe you'd better get the game too! Endearingly entitled *I Yam What I Yam*.

Bug-Byte, now under the wings of Argus Press Software, has begun importing software from down under for release in this country. *Ollo I and II – First Mission and Final Assault* is the title of the Aussie game and was in the Top Ten in its home country.

Claims made by Bug Byte for the game are as follows: stunning graphics and sonics, two games in one with four separate sections each, and a ridiculous level of addiction.

Les Adventures!



FOREIGN SOFTWARE IS ALSO ARRIVing from across the channel. Infrogames, a big French software house is soon to release *Mandragore*. The date for launch is, significantly, 14 July, Bastille Day.

The *Mandragore* package includes two cassettes to accommodate the 260K program, an instruction book and a 10 chapter book of hints and tips. It's a role playing graphic adventure and there are hints of a trip to the south of France for a few lucky players. Look out for more details.

NEXUS the much heralded arcade adventure from new software house, NEXUS, is now available for the C64. At a cost of £9.95, it involves you in an attempt to crack an evil drugs ring. Only the NEXUS team can supply you with the information you need to complete your mission.

A new scenario for a computer game comes from Ariolasoft with the release of *Standing Stones* on the C64. This is a new graphic adventure set at Stone Henge, where you must recover the Grail, Mithril Chain Mail and other fabulous treasures from ancient folklore. The treasures lie hidden deep beneath the ancient monument. It's £14.95 on disk.

The long awaited Japanese adventure from Virgin, *Shogun*, has now been released and Virgin hopes it will do as well as the book and TV series which preceded.

The game is chock-a-block with 40 characters and you may choose which one you wish to be. Each one has a personality and life of its own and you must learn to manipulate them. *Shogun* is £9.95 on cassette and £12.95 on disk.



Touch Line

Firebird: Wellington House, Upper St Martin's Lane, London WC2H 9DL. 01 379 6755.
Mastertronic: 8-10 Paul St, London EC2A 4JH. 01 377 5569.
Alpha-Omega: 9 Kings Yard, Carpenter's Rd, London E15 2HD. 01 985 6877.
Macmillan Software: 4 Little Essex Street, London WC2R 3LF. 01 836 6633.
Bug Byte: Liberty House, 222 Regent Street, London W1R 7DB. 01 439 0666.
NEXUS: DSB House, 30 High St, Beckenham BR3 1AY. 01 658 5723.
Ariolasoft: 68 Long Acre, Covent Garden, London. 01 836 3411.
Virgin Games: 2-4 Vernon Yard, Portobello Road, London W11 2DX. 01 727 8070.

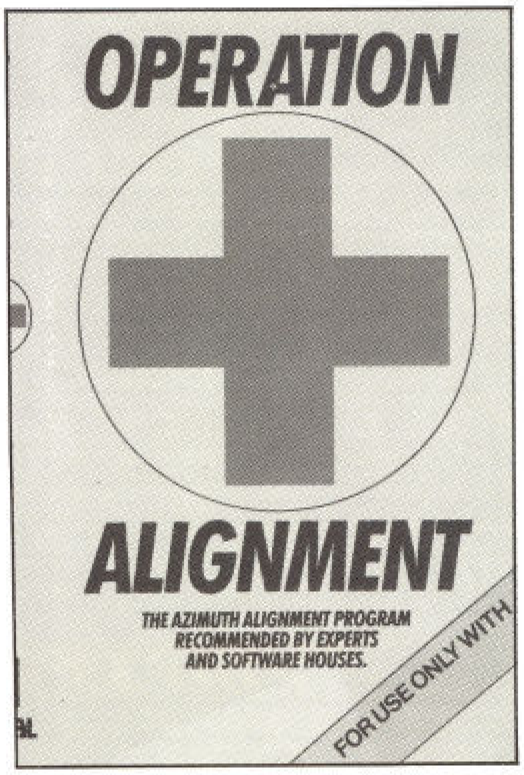
But Seriously

OPERATION ALIGNMENT, FROM Global Software, is an offspring of *Operation Caretaker*, a product released last year. The new package contains just the alignment tape and screwdriver for adjusting tape heads and is in a smaller wallet. The price is smaller too at £5.95.

Kuma Computers is entering the Amiga software market with an Editor/ Assembler/Debugger entitled *K-Seka*.

The package includes an Editor, Disassembler, Linker and Machine Code Monitor and operates under Amiga DOS.

K-Seka is available now and costs £79.95.



Touch Line

Global Software: PO Box 67, London SW11 1BS. 01 228 1360.
Kuma: 12 Horseshoe Park, Pangbourne, Berks. 07357 4335.

And the Rest

ACTIVISION HAS WANDERED INTO the world of psychology to give you the chance to live out your life over and over again – how horrific!

The new game is called *Alter Ego* and it delves into every aspect of your life, from birth to old age. The program processes and tracks the player's input to develop the alter ego's experiences, status and personality.

A status report shows the player which type of responses influence his alter ego's skills in several areas: social, intellectual, emotional, phsyical, familial and vocational.

Because of the nature of the program there are different male and female versions.

There is also a warning which comes with the game. Because of the nature of some of the material used it is unsuitable for under 16s and PARENTAL DISCRETION is advised.

Have you a little Vic sitting in the cupboard under the stairs and gathering dust? Well, now it's time to let it see the light of day again!

Llamasoft has come to the aid of languishing Vic-20 owners with the *Viva Vic* collection. Games such as *Abductor, Gridrunner, Traxx, Andes Attack, Laserzone, Matrix , Metagalactic Llamas Battle at the Edge of Time* and *Hellgate*.

It is now available in 8K or 16K expansion and costs £6.50.

Touch Line

Activision: 23 Pond Street, Hampstead, London NW3 2PN. 01 431 1101.
Llamasoft: 49 Mount Pleasant, Tadley, Hants. 07356 4478.



Hard Lines

MICROTEXT HAS COME UP WITH A teletext adaptor for the C64 or 128 so that users can access the hundreds of free teletext pages available 24 hours a day on all four UK channels.

It is suitable for use throughout Europe (except France) and Australia and New Zealand. The free pages which can be accessed using this adaptor include news, finance, sport and features. Any page can be saved to disk and reused later.

For the overall price of £69.95 the adaptor is supplied plus a connecting lead, software on cassette and a manual. There is a 12 month guarantee on the package and the software is unprotected so backup copies can be made.

Miracle Technology's 64 *Multimodem* has now received British Telecom approval.

The new modem is menu-driven and multi-speed. It supports CCITT V21/23 and Bell standards, handles baud rates of 300/300, 1200/75 and 75/1200. This allows access to Prestel, Micronet and Microlink and numerous viewdata services and bulletin boards. It costs £998.50 (£116.15 including VAT and UK delivery).



Touch Line

Microtext: 7 Birdlip Place, Horndean, Hants PO8 9PW. 0705 595649.
Miracle Technology: St Peters Street, Ipswich IP1 1XB. 0473 216141.

Generally Speaking

A FURORE HAS BLOWN UP IN THE tape manufacturing industry over government plans to introduce a tape levy on blank audio cassettes.

Christopher Hobbs, Chairman of the Tape Manufacturers Group said it would be "an administrative nightmare bound in expensive red tape perforated with legal loopholes".

The group has issued a whole list of objections on behalf of the manufacturers. They state that home taping doesn't damage copyright owners interests, that no distribution of the money realised by the government levy could be fair. The levy would inflate the price of tapes and the administration to collect money raised in this way would be cumbersome. The rebate system would also penalise the disadvantaged, such as the blind, because it would not include distributors and retailers mark-ups. There is also a possibility that the levy is illegal under EEC law.

The Consumers Association has also come out against the government in this issue saying that the levy on blank audio cassettes is a "cynical excercise in producer muscle".

Rosemary McRoberts of the Consumers Association said: "Ordinary customers who buy blank tapes are not pirates or counterfeiters, and they don't make dozens of copies of copyright performances."

Yellow Peril

BRITISH TELECOM IS TO INTRODUCE an electronic version of the Yellow Pages Directory. Information on advertisers will be held on a central database accessible to anyone with a suitable communication terminal.

Initially, the Electronic Yellow Pages (EYP) will contain information covering the London, Reading and Guildford areas.

Richard Hooper, of BT's Value Added Systems and Services Division said: "Electronic Yellow Pages will be a valuable addition to our growing range of electronic publishing products. EYP will not be a substitute for the printed book, but, as an extension of it, will allow Yellow Pages advertisers to meet a real market need by adding up-to-the-minute information to their advertising.

The new service will be launched in January 1987.

Touch Line

Consumers' Association: 14 Buckingham Street, London WC2N 6DS. 01 839 1222.
The Tape Manufacturers Group: Aspect PR, 17-19 Foley Street, London W1P 7LH. 01 580 9074.
British Telecom: 81 Newgate Street, London EC1A 7AJ

DATA STATEMENTS

Stop Press

IN A NEWS ITEM IN OUR JUNE 1986 issue, we stated that Ariolasoft was giving prizes to 12 people who achieved a handicap of zero in Golf Construction Set. In fact, there is only one prize which will be awarded to the first person to achieve this amazing feat. We would like to apologise for any confusion caused by this error.

Also in the June 1986 issue, we published the wrong address with our article 'Graphically Speaking' which reviewed the Vidcom 64 package. The product is from CRL – not Activision – and can be obtained for £4.95 from: CRL, 9 Kings Yard, Carpenters Road, London E15 2HD. Tel: 01 553 2918.

COMPETITION

This month we bring you a musical competition from Nu-Wave.

REMEMBER MIKE OLDFIELD'S CLASSIC album, *Tubular Bells*? It was a cult in the seventies and now Nu-Wave Software has introduced it to the computer era with an alternative style of software.

Nu-Wave's *Tubular Bells* program features the entire soundtrack of the original album plus graphics which keep time to the music and also compliment it.

We have a top prize of a copy of *Tubular Bells*, the album, signed by Mike Oldfield, plus *Tubular Bells*, the video and *Tubular Bells*, the computer program. The top prizewinner will receive all of these.

There are also 29 runners up prizes of copies of the Nu-Wave program.

How to Enter

We want you to show us your knowledge of popular music by naming a maximum of seven song titles which feature the names of the days of the week. You should have one song title per day.

For example, if you think there is a song called 'You only love me on Mondays', then write this in the space provided on the entry form and go on to Tuesday. There may be a song called 'Tuesday Girl', if there is then this could be your answer for Tuesday. Continue until you have thought of as many as you can, remembering that we only want ONE for each different day.

When you have completed this, fill in the rest of the entry coupon and seal it in an envelope. Write the number of titles you thought of on the back of your envelope. You may enter as many times as you wish but each entry must be sealed in a separate envelope and on an original entry coupon not a copy.

The closing date is Friday, 29 August 1986. Send your entry to, Nu-Wave Competition, Your Commodore, 1 Golden Square, London W1R 3AB.

The Rules

Entries will not be accepted from employees of Argus Specialist Publications, CRL and Alabaster Passmore and Sons. This restriction also applies to employees' families and agents of the company.

The How to Enter section forms part of the rules. The editor's decision is final and no correspondence will be entered into.



Nu-Wave Competition
Entry Coupon

Name ....

Address ....

....

.... **post code** ....

Monday Song ....

Tuesday Song ....

Wednesday Song ....

Thursday Song ....

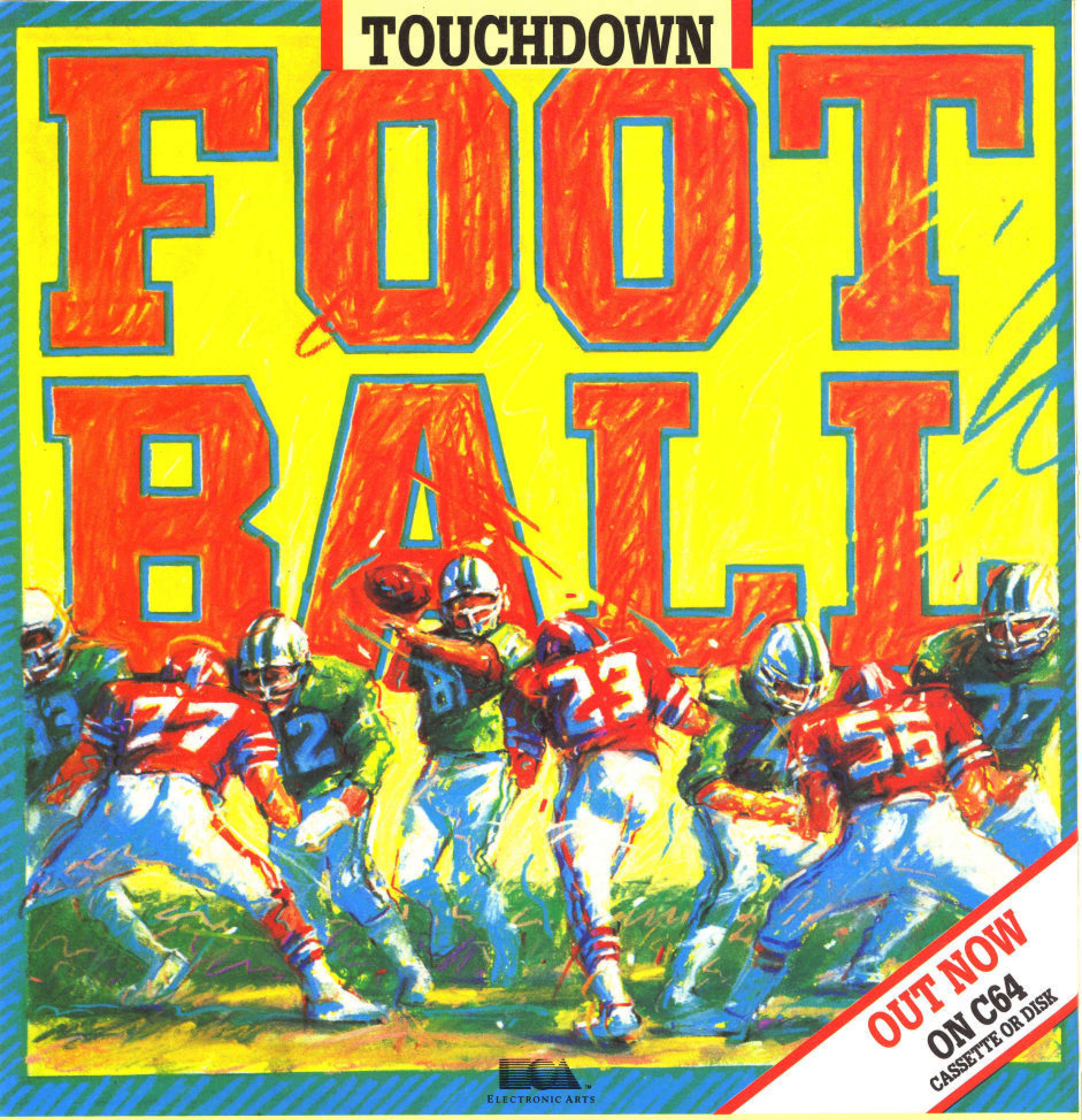
Friday Song ....

Saturday Song ....

Sunday Song ....

Send your entry to: Nu-Wave Competition, Your Commodore, 1 Golden Square, London W1R 3AB. Closing date: Friday, 29 August 1986.


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SOLO
RUPERT AND THE ICE CASTLE
ICE PALACE
LEAPER
SOULS OF DARKON
Sci-fi fantasy with magical graphics from beyond the sun of Crenal.
HOODOO VOODOO
Defeat the Bloopalgrop curse of Krellis IX. amazing graphics.
SOLO
Fast and furious action. The Batlegroms are coming . . .
RUPERT
Lots of slippery fun with Rupert's chums. 4* review C.C.I.
LEAPER
All action animation, 6 Gribblies, the last VW and great music.
Argus Press Software Group Liberty House 222 Regent Street London W1R 7DB 01-439 0666
"Byte Me" bright yellow tee shirts are gr-gr-great — £3 (S/M/L).
Selected titles are available at W.H. Smiths and all good computer stores.



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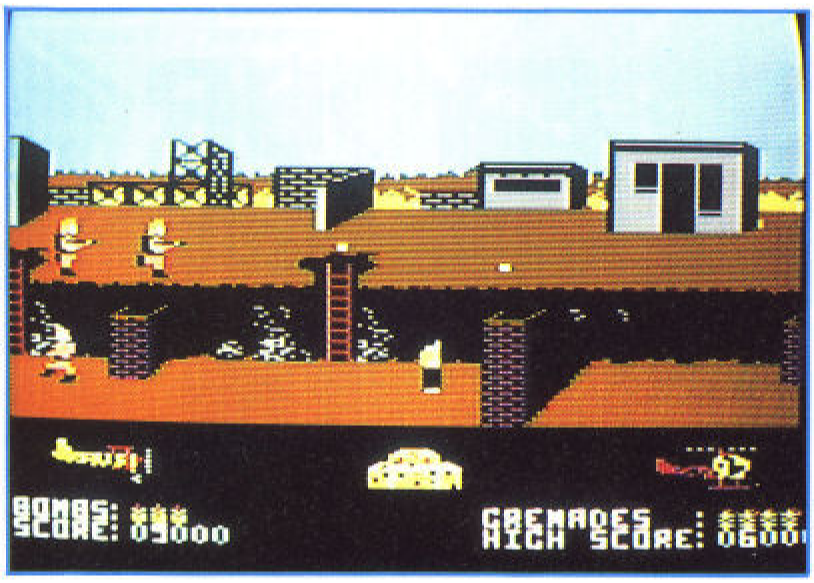
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Cassette **£9.95**





Eric Doyle takes a look at Mirrorsoft's new game — Biggles.

Game of the Month

BIGGLES HAS BEEN THE HERO OF many children down the years and, with the advent of the movie, Mirrorsoft has released the computer game.

Biggles is a flying ace who gets into all sorts of scrapes with his friends Algy, Bertie and Ginger. In the film story, several new characters are introduced including the beautiful double agent Maria.

The computer program is heavily based on the film. It comes in two parts: Timewarp and Sound Weapon. Timewarp must be completed first if you want to stand a chance of destroying the Sound Weapon in part two.

Timewarp is really three games in one. Biggles appears in a biplane shooting down enemy fighters in 1917. He can then warp into present day London and then back to ground combat in 1917.

Biggles in the Air sees our hero beset by enemy planes and flak. He can fire his cannon at the planes or drop bombs on the cannon but his bombs are limited. You always have to keep one bomb in reserve to hit an enemy arsenal which replenishes your supply. Manipulating the plane to avoid the enemy fire can become quite tricky, especially when an enemy plane is zeroing in on you. At any time a flash of lightening can appear as you warp into one of the other games. If you are hit by enemy fire it will also warp you into another scene.

Biggles in London reveals our hero and his time twin Jim stranded on the rooftops of London. Their only escape is to leap from building to building, avoiding enemy guards and gunfire. Only one of the twins can be moved at a time, the other squats awaiting his turn to move. At all times both characters must be on the screen. The strategy is to take a long run up and jump across to the next building, avoiding the patrolling guards. Then find somewhere safe for the character to wait while you bring his twin across.

This is not an easy task especially when a sniper starts shooting from a nearby window. Once again time warps will blast you out of this scenario.

In Biggles on the Battlefield you may think for a moment that you've warped into a game of Commando. You haven't, but the rules are similar. Shoot all the guards and throw hand grenades at the pill boxes to silence the guns. Biggles has little room to dodge about in and he has to descend into one of the many caves to restock with grenades when his supply runs out.

As a guide to your success rate three icons are shown at the bottom of the screen. Each time you fail another piece of icon disappears. If an icon vanishes you must start again.

If all three games are completed in the correct order, Air-Battlefield-London, you are given a codeword to start the second part of the game.

The Sound Weapon is a helicopter flight simulator but don't let that worry you. The controls are fairly simple and the graphics with their 3D scrolling give added realism to the game.

Before destroying the Sound Weapon you have to perform certain tasks. The first of these is to pick up Maria who is in the allied camp and deliver her safely to the convent. Flying to the allied camp gives good practice at steering the helicopter using the radar and compass to keep on the correct bearing.

The radar has two modes of operation. In long range mode it shows the sector you are currently in and the type of enemy you may encounter. Avoiding areas of heavy enemy infiltration is advisable until you are sure of your combat capabilities. Other areas may also have enemy planes which could prove deadly.

The hints and tips given for this section are invaluable otherwise you could be wandering across the extensive mapped area for a lifetime. You are told to examine the south west corner carefully before heading for the convent. Extra fuel and Biggles' friends are somewhere around here so the hint is worth taking because without these the mission will fail. Each friend has a particularl skill or ability. For example, one of the team is good at repairing the helicopter and should prove invaluable when the heat is really on.

Eventually you will locate the weapon's test site and complete your mission by destroying it.

Recent games-of-the-film have been disappointing (to say the least) but this one gives an excellent sense of the movie's atmosphere. When playing the game I found the Timewarp extremely challenging. Just when you think you've mastered the correct method of attack you'll find that you've boxed yourself in with no hope of escape. Sometimes it will be a lack of bombs or grenades, another time it will be a patrolling rooftop guard or a short run up for a long jump that ends your life and warps you off into another scene.

The graphics are not the best I've seen but certainly nothing to complain about. Workmanlike is the best description.

The program is accompanied throughout by music. No facility is available to switch the music off but at least it's not too irritating. Produced by Tony Crowther's little team, the music is proof that Ron Hubbard is in danger of losing his crown in the near future.

When reviewing a game I like to play through as far as possible. Unfortunately the fact that you need to complete the first part before standing a good chance of completing the second game means that I only really viewed the Sound Weapon scene as a tourist rather than as a combatant but I must say I was impressed with what I saw, even if it did resemble a poor man's Firefox.

When a game offers as many challenges as this one does it would be impossible to say that it lacked appeal. This is one of those packages with something for almost everyone and should not be ignored. If you have any doubts don't ignore the game try to find a copy and give it a whirl.

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STAR QUALITY

Eric Doyle gives his verdict on the Star NL-10 printer

PRINTERS ARE A PAIN IN THE NECK. They use complicated codes, tailed letters on the Commodore printers do not descend below the line, other printers need interfaces which means more spaghetti trailing out the back of my computer, and the printouts look like a monochrome attack of the measles. If you've ever voiced any of these reasons for not buying a printer, Star Micronics must have been listening because the NL-10 printer goes a long way to eliminating them.

First and foremost, the printer is available with a Commodore interface which fits neatly and easily into a recess in the back of the printer so you don't spoil its very trim appearance. Connection to your Commodore is via the usual standard DIN lead and the interface has two sockets to allow daisy chaining to other peripherals such as a disk drive. A secondary benefit of this is that if Commodore ever changes to a new printer operating system, Star can produce a new interface module to match and save you the expense of buying a new printer.

The interface allows you to select PETSCII code (Commodore's character numbering system) or ASCII code at will. This can involve typing a code such as:

```
PRINT # 4,CHR$(27;CHR$(93);CHR$(48)
```

Just thought I'd throw that in to panic you. Star does not totally get away from the CHR$ heiroglyphics but some of the standard printer features can be changed either by the usual array of DIP switches or by skillful use of the diaphragm switches on the front of the printer.

Switched On

The DIP switches are easily accessed at the back of the printer but I don't see why DIPs are so loved by the majority of printer manufacturers. They're so small that you have to use the tip of a ballpoint pen or a small screwdriver to flip them. Admittedly, a three year-old child could use them but my fingers ae substantially thicker than that. In a business environment these switches would normally only be set once but I have to use them a lot in my work and they really are a nuisance. My own theory is that a pact has been made with ballpoint pen manufacturers to offset the unemployment that wordprocessors may create in their industry!

The switches are set as a bank of eight allowing or negating auto line-feed and paper-out detection, or for setting a standard page length, device number plus ASCII/Commodore mode. Several

THIS IS THE NLQ TYPEFACE

THIS IS THE STANDARD DRAFT PRINT WITH UNDERLINING

THIS LINE IS CONDENSED PITCH

THIS LINE IS IN ELITE PITCH

THIS LINE IS IN NORMAL PICA PITCH

THIS SHOWS PROPORTIONAL SPACING

EXPANDED CHARACTERS

BOLDFACE

EMPHASIZED

EMPHASIZED BOLDFACE

EITHER SUPERSCRIPTS OR SUBSCRIPTS IF YOU PREFER

ROMAN CHARACTERS *OR ITALICS*

DOUBLE OR EVEN QUAD SIZED PRINTING

foreign character sets can also be selected using a combination of three of the switches.

The front panel selectors are used singly or in combination to allow swift access to varius useful printer modes. By holding down the relevant keys when you switch on, you can initiate a printer test, start up in NLQ italic mode or switch the computer into hex dump mode.

NLQ stands for Near Letter Quality which means that the printer takes two passes to print a line but the quality is very close to that achieved by a typewriter or daisywheel printer instead of the lesser quality achieved by straight forward single pass printing (draft mode).

The hex dump mode is very useful for checking the output from your computer to the printer. Instead of the usual row of characters the printer gives the information in raw hexadecimal numbers. It is also a quick way of doing a memory dump for machine code programming purposes.

Now that I've actually reached the point where the printer is turned on we can investigate the other special features of the NL-10.

Features

The front panel switches can now be used to carefully align the top of the paper (TOF) with the printer head and set the right and left margins.

The ability to set margins does rather spoil the next feature on the panel which allows you to select the number of characters per line. These figures are specified for the default width of the printed line and are measured in characters per line (CPL). If you set margins to anything other than their default values, then the maximum value of CPL alters too. I would like to see the measure of characters per inch (CPI) listed alongside the CPL value instead of being hidden away at the back of the manual.

For the record the values of CPL given are 80, 96 and 128 in draft mode plus 80 in NLQ.

In addition to the normal pica width characters there are three other typefaces: elite, condensed and the aforementioned italics. Bold, expanded, emphasised, underlined, double and quadruple height and width characters plus proportional spacing can also be produced. Of these only bold can be selected directly from the front panel. If this is not enough you can define your own characters for special purposes.

Defining characters is the strong point of matrix printers over daisywheels because it allows the dumping of high resolution screens on to paper. Doing this does involve an extensive amount of programming and for most people it would be beyond their abilities. Nearly all commercial sketch pad programs have a screen dump facility, however, and magazines have often published them in the past. Most of these utilities are designed for Epson printers but because of the compatibility of this machine with the Epson standard most routines will be useable with the NL-10.

Using the machine has proved to be delight. Sprocket wheels allow the use of tractor drive paper and a friction platten will pull normal sheets of paper through. This means that it is ideal for business or private use. There is a selector switch to the right of the platten which determines the paper feed mode and for the adventurous a sheet paper hopper for auto-feed is included.

Although Star has gone a very long way towards user friendliness, the company has failed to take advantage of the capabilities which a machine specific interface allows. All of the CHR$ codes could have been replaced with simpler, user-friendly commands. Perhaps in future models this will be rectified, after all we're not a nation of computrer buffs. Compared to the opposition, this machine is either more advanced or cheaper and offers great value for money.

The greatest facility which the NL-10 sports is the NLQ typeface. No more will I have spots before my eyes after a long printing session.

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The *Your Commodore* Software Service makes available all of the programs for the C64 or C128 on disk or tape published in *Your Commodore*. The cost of a cassette is £4.00 and a disk will cost £6.00.

Unless otherwise stated all C64 and C128 programs are available on the one cassette so you simply need to order the one cassette.

None of the programs are protected and we suggest that you make back up copies before you use the programs.

All programs on the cassette will be saved using a tape turbo routine. However, we cannot guarantee that all programs will work correctly with this turbo routine present. We therefore recommend that before you use any of the programs you make a copy of the programs on your own cassette or disk and use this version of the program **not** the original.

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WELCOME TO THE MACHINE

Allen Webb on the complexities of machine code.

First a little snippet of news. I hear that Ocean has brought out a new assembler system – *Laser Genius*. The company tells me that the assembler part is the same as *White Lightning* but there is a new feature – an analyser is included. Apparently this allows you to set intelligent break points and, on breaking, examine the previous instructions. It certainly sounds like the answer to many problems.

The BIT Instruction

There is a handy instruction called BIT which performs a logical AND (see later this part) of a memory location and the accumulator. As usual this is non-destructive. If the result of the AND is zero, the zero flag is cleared otherwise it is set. Additionally, the overflow and negative flags are set according to the value of bits six and seven of the memory location. Listing 1 gives a way of generating a non-destructive cursor using BIT.

Listing 1

```
10 ASSEMBLE 90,I
90 REM *=$C000
100 REM .LOOP: BIT $0400
110 REM BMI LOOP1
120 REM LDA $0400
130 REM ORA £128
140 REM STA $0400
150 REM JMP DELAY
160 REM .LOOP1: LDA $0400
170 REM AND £127
180 REM STA $0400
190 REM .DELAY: LDX £3
200 REM . DELAY2: LDY £100
210 REM .DELAY1: DEY
220 REM BNE DELAY1
230 REM DEX
240 REM BNE DELAY2
250 REM JMP LOOP
260 REM ]
```

This routine is rather contrived but illustrates one way of using BIT to monitor bit seven of a single memory location (in this case, the top left corner of the screen). Since BIT functions only in absolute and zero page, it isn't really suited to perform this function for the whole screen unless you load the current cursor position by indirect indexing into a memory location and BIT that.

Line 100 copies the value of bit seven of the contents of location $0400 into the negative flag. It happens that this bit is used to show whether or not the character on the screen is normal or reversed field. If bit seven is set (reversed field character), the program branches to line 160 where the bit is cleared (line 170 does this). Otherwise line 130 sets the bit. Lines 190 to 240 perform a simple delay.

You will notice that lines 130 to 170 use some new instructions. These are some of the logical or Boolean instructions. Boolean instructions use various rulse to allow the combination of bit patterns. These are used in a variety of ways.

The first instruction is AND. This instruction follows the following truth table:

A	1	0
B		
1	1	0
0	0	0

Using this table if AND two set bits, the result is a set bit. All other combinations result in a zero bit. Imagine that you want to ensure that a location never holds more than 15. The fol!owing sequence will ensure this:

```
LDA number
AND £15
STA location
```

If the accumulator contains binary %11001010, this sequence will have the effect:

%11001010 AND %00001111 = %00001010

We have effectively masked out the top four bits. Hence by using AND we can selectively remove or retain bits.

Line 170 in Listing 1 clears bit seven by ANDing with 127 (%01111111). The next instruction is the inclusive OR. This has the truth table:

A	1	0
B		
1	1	1
0	1	0

In effect, if either bit is set, the result is a set bit. OR allows the selective setting of bits. Line 130 in Listing 1 sets bit seven by ORing with 128 (%10000000).

Finally we have the exclusive OR (EOR):

A	1	0
B		
1	0	1
0	1	0

This instruction can be used as a comparison tool since dissimilar bits result in a set bit. It can also be used to complement or invert a bit pattern. Consider the effect of:

%11011011 EOR %11111111 = %00100100

This effect is very handy in graphics to obtain reverse field effects.

Summing It Up

Last time I was very friendly in my dealing with arithmetic. Things are in fact a little more involved than I indicated but I didn't want to put you off then. Now, unfortunately, we have to look at things in a little greater detail.

The rules for adding binary are quite simple:

Two zero bits when added result in a zero bit;

Adding a zero bit to a set bit results in a set bit

Adding two set bits results in a zero bit and a set carry. The following examples will show what I mean:

```
0010 +        0011 +
0100          0010
0110          0101
```

I've already mentioned that bit seven is the sign flag. What happens, therefore, if your addition gives a result with a set seventh bit? Clearly this is incorrect since we've generated a negative number. The answer is that this action results in an overflow which sets the V flag. Here is an example:

```
01001100+
01000000
10001100
```

The overflow flag is set when there is a carry from bit six to bith seven and can occur in one of four situations:

i) When large positive numbers are added.

ii) When large negative numbers are added.

iii) When a large positive number is subtracted from a large negative number.

iv) When a large negative number is subtracted from a large positive number.

Clearly, you must make allowances in your coding to check for overflow if you are using signed arithmetic.

In signed binary, bit seven is set to denote a negative number. Consider this example in which we try to add +8 to -3

```
+8 .............. 00001000 +
–3 .............. 10000011
                  10001011
```

The result is -11, which is clearly incorrect. There is a bug in adding binary this way. The solution is to use the concept of two complements to represent negative numbers. To get the twos complement, you invert each bit and then add one. Here are two examples:

5 = 00000101

invert the bits: 11111010

add 1: 11111011 =–5
8 = 00001000
invert the bits: 11110111
add 1: 11111000 =–8
Let us go back to our earlier example but using two complements:
+8. . . .000001000 +
–3. . . .111111101
000000101
The answer is five as required. We ignore the carry flag. Using two complementing, we can add or subtract signed binary numbers at will. It won't take much thought to realise that subtraction is simply the addition of a number to the twos complement of the other.

These comments will be of most value to those of you who wish to manipulate real data rather than playing games. If that is your goal, then further reading from a standard text, such as *Zaks*, is mandatory.

Those of you who have used electronic measuring equipment, may have come across Binary Coded Decimal (BCD). This is a frequently used format for data transmission. The 6502/6510 allow you to use BCD. To enter decimal mode, you must set the Decimal flag with the instruction SED. To return to binary mode, you clear the flag with CLD. In decimal mode, a byte is used to hold two four bit coded numbers. These are:

CODE	**BCD DIGIT**
0000	0
0001	1
0010	2
0011	3
0100	4
0101	5
0110	6
0111	7
1000	8
1001	9

Consider a location holding the bit pattern 00100010.
In binary mode it contains 34.
In decimal mode it contains:

0010 0010
or 22!

The reason is that the left nybble contains the 10 coded as above and the right nybble contains the units.
Try listing 2:

Listing 2

```
10 ASSEMBLE 90,I
90 REM *=a1■C000
100 REM SED
110 REM CLC
120 REM LDA 900
130 REM ADCA 901
160 REM STA 902
170 REM CLD
180 REM RTS
190 REM ]
```

Try running the routine both in decimal mode and in binary mode (by erasing line 100). If you try with a value of six in each of 900 and 901, i.e. you are adding six and six, you should get 12 in binary mode and 18 in decimal mode. The reason is that the result of adding six and six is put into 902 as the two nybbles representing one and two:

0001	0010
1	2

When you peek 902, however, you get 18 since 18 in binary is 00010010. Try some other combinations of numbers. Never forget to include the CLD instruction before you return to Basic since failure to do this will cause a crash.

BCD can also be of use when calculating scores in games without recourse to floating point.

The Stack

I have previously mentioned an area of of memory called the stack. It might be a good idea if we finish this time with a few paragraphs on this item.

The stack is essentially a scratch pad which the microprocessor uses to remember things. For example, when the processor executes a jump subroutine instruction, it must somehow remember where to return to at the end of the subroutine. It therefore saves details of the return address on the stack. The size of the stack is limited which explains why you are limited in the number of nested GOSUBs you may have in Basic.

Not only is the stack useful to the machine, it is also useful to you. It is a simple matter to temporarily push data on to and pull data off the stack. Four instructions perform such tasks:
PHA: pushes the accumulator contenst on to the stack.
PLA: pulls the next stack value into the accumulator.
PHP: pushes the status register on to the stack.
PLP: pulls the next stack value into the status register.

The current value on the stack is monitored in a eight bit register called the stack pointer. It is often handy to save or alter this pointer. Two instructions allow this:
TSX: transfer stack pointer to X register.
TXS: transfer X register to the stack pointer.

One word of warning. You must take care to balance you push and pull instructions and monitor how you change the stack pointer. If not, you may end up with a nasty crash.

Homework

You may find these problems a bit more challenging.

1) Write a routine to place a character at a specified location on the screen. (Hint: If X is the horizontal position (1 to 40), and Y is the vertical position (1 to 25), then the memory location occupied by the character is given by LO=1024+(Y–)*40+X.)

2)When plotting high resolution graphics, a new point is created by ORing the relevant memory byte with a mask corresponding to the point to be set. This mask is equal to two raised to the power of the bit number corresponding to the position of the point in the memory byte. Why?

3) Running on from question 2, the following sequence of code will set the bit whose value is inthe X register and the memory location to be masked is held in $FB and $FC:

```
LDY £0
LDX BIT
LDA ($FB),Y
ORA TABLE,X
STA ($FB),Y
RTS
TABLE .BYTE 1,2,4,8,16,32,64,128
```

Write a similar routine which will erase a sepcified point. If you're unsure about how high resolution graphics work, try reading the *Commodore 64 Programmer's Reference Guide.*

The Answers

Last month we started on simple 16 bit arithmetic. The homework should help reinforce the material discussed.

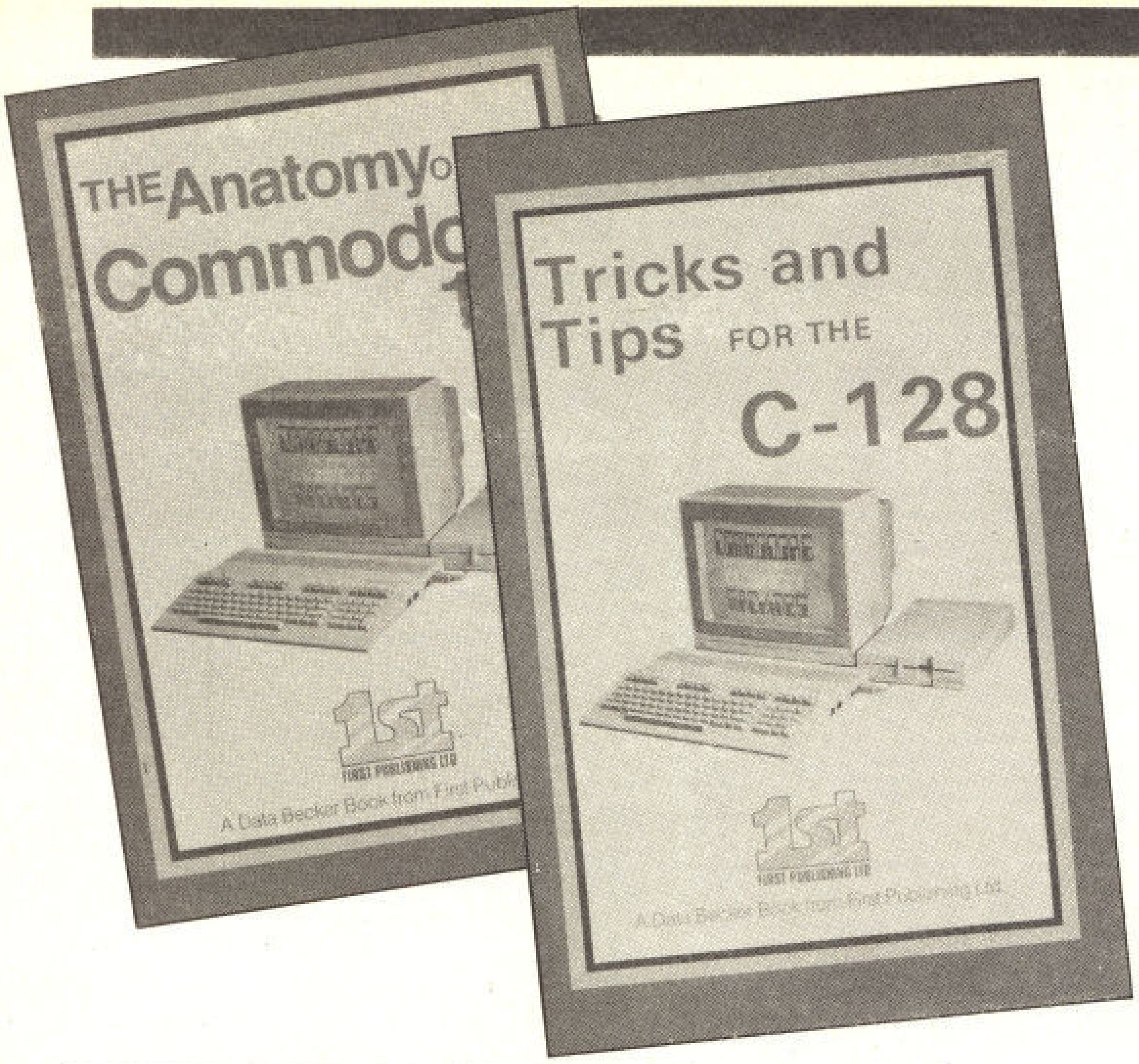
The first question was a bit of a trick question. To multiply an eight bit number by 256, you simply move the eight bit number into the most significant byte of a 16 bit number and zero its least significant byte.

Question 2 is a frequently met situation where you're handling data on the screen and you want to move down a line. Here is my solution:

```
10 ASSEMBLE 90,I
90 REM *+C000
100 REM CLC
110 REM LDA 900
120 REM ADC £40
130 REM STA 900
140 REM BCC EXIT
150 REM INC 901
160 REM .EXIT: RTS
170 REM ]
```

The third example was simply included to make you think a bit. This solution is the neatest I can come up with:

```
10 ASSEMBLE 90,I
90 REM *=$C000
100 REM CLC
110 REM ASL 900
120 REM ROL 901
130 REM LSR 903
140 REM ROR 902
150 REM CLC
160 REM LDA 900
170 REM ADC 902
180 REM STA 904
190 REM LDA 901
200 REM ADC 903
210 REM STA 905
220 REM RTS
230 REM ]
```



Title:
The Anatomy of the Commodore 128
Author:
K Gerits, J Scheib & F Thrun
Publisher:
First Publishing Ltd
Price: £12.95

SUCH A DETAILED BOOK AS THIS OFten takes many months to clear all of the copyright problems which precede its release. It's immensely pleasing to see the C128 laid bare to the enquiring mind so soon after the machine's UK release.

The book is in two principal sections: a long and detailed look at accessing the facilities offered by the computer and a full disassembly of the ROM routines.

Although the book goes into depth on the 128 mode, the CP/M mode is a little more sketchy and 64 mode is virtually ignored. This is not really a criticism of the book, after all the C64 is well documented already and the CP/M section does give enough detail on the Commodore CP/M to allow a general book on CP/M to take over.

The first chapters deal with 128 programming for the informed user. No long duplications of Commodore's introduction to Basic here, it's straight in to the control programs for the Memory Management Unit, 80-column high resolution screen, accessing the Kernal routines and much much more.

Each chapter is dedicated to an individual chip (including the Z80 and 8563 video chip) and technical specifications are revealed alongside the more digestible hints, tips and programs.

The ROM disassembly is highly detailed with a short description accompanying each line of code so that the reader can easily determine just what the ROM is up to at any particular point.

If you're serious about your 128 you can't do better than this impressive tome.

Title:
Tricks and Tips for the C-128
Author:
T Weltner, R Hornig, J Trapp
Publisher:
First Publishing Ltd
Price:
£12.95

SOME OF THE CONTENTS OF THIS book are duplicated in the Anatomy of the Commodore 128 but in no way does it destroy the value of either. Tricks and Tips is aimed more at the intermediate programmer than the advanced user but, as an introduction to the hidden abilities of the machine and as an aid to fledgling machine code programmers looking for something to do with their new found knowledge, it has no peers.

The large typeface used throughout the book could be described in kinder moments as a useful concession to disabled readers who gain a lot of pleasure and practical help from their computer. If I want to be wicked, I would say that it uses more paper and makes the book look as thick as its companion books thereby justifying the cover price, but I wouldn't be that nasty.

The routines given, range from simple software protection on disk and tape, interrupt driven music, graphics routines, sprite and character generation, multiple windows and the MMU. There is even a section on adding extra commands to Basic. For those throwing their hands up in horror saying that there are enough 128 commands for even the most discerning programmer, buy this book you'll definitely benefit from it!

Many of the smaller tips are little gems which would take months to unravel if this book was not in your library. The book fully describes all of the techniques used in clear concise English (the authors are German) and it should provide hours of fascinating study.

Title:
Commodore 64/128 Graphics and Sound Programming
Author:
Stan Krute
Publisher:
TAB Books Inc.

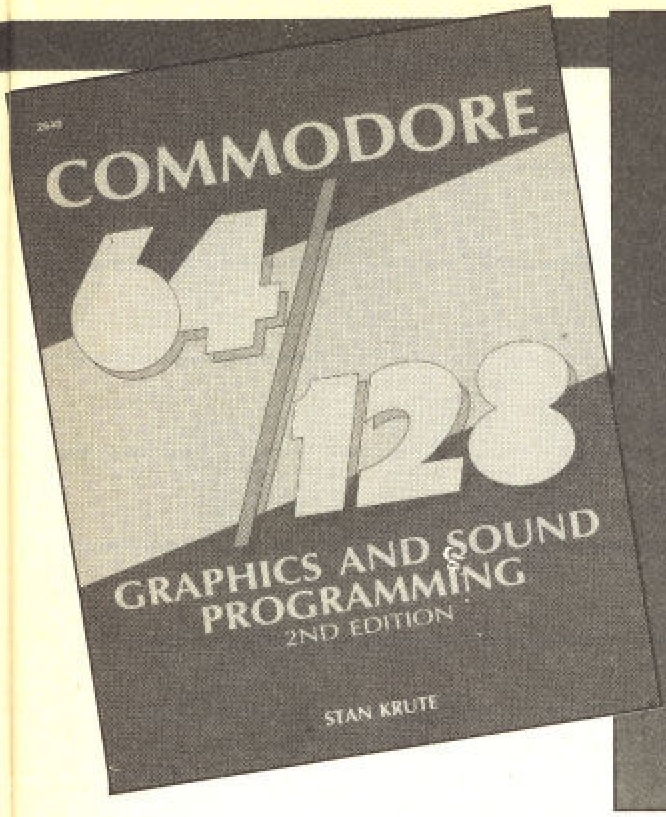
DON'T BE FOOLED BY THE TITLE, THIS book is solely for the C64 or the 128 in 64 mode. Although this title looks good on the cover, I think it will put off more buyers than it attracts. C64 owners may pass it over with a cursory glance thinking that half of the book will prove irrelevant to their machine.

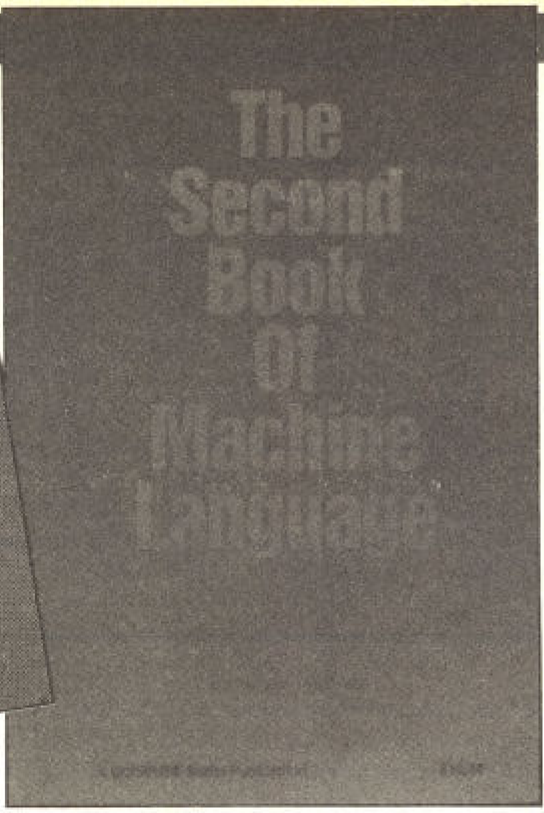
Kicking off with sprite programming, the book soon advances to moving the shapes around the screen and overlay animation techniques in unicolour and multicolour. The author then moves on to deal with character graphics in a similar way and then we have an elementary high resolution chapter. The listings, and there are an awful lot of them, are in Basic, very clearly printed and they work (slowly).

The audio section deals with the shaping of musical sounds and sound effects. There are a few really good noises in amongst this lot. One criticism I will make is that a sample program using machine code interrupts would have slotted quite nicely in with the sample machine code program at the end of the book.

The final section puts it all together,

BOOKS





sound and graphics in synchrony. The sample program is especially synchronic, it's a dull program. Two creatures take turns dropping from a skyhook on to a see-saw, catapulting the other back up to the hook. Surely a small simple game could have been developed from this?

The appendices give grids and programming aids which are the best thing this book has to offer.

Title: The Second Book of Machine Language
Author: Richard Mansfield
Publisher: Compute! Books/ Holt Saunders
Price: £12.95

IF MACHINE LANGUAGE FOR BEGINners was an introduction to the vocaulary of machine code, then this book is an essay on the grammar of the language. More than this, working through the book gradually builds up a powerful assembler program which not only teaches the basics of machine code programming structure but also acts as a useful addition to your utility library for creating your own routines and programs.

As the name suggests, the Label Assembler Development System (LADS) allows the use of labels and comments within a program which looks like a normal Basic program except that it uses its own mnemonic language based on normal machine code mnemonics.

This forms a much easier way to construct a machine code program and not being in code itself means that it can be used to show many of the facets of programming including communicating with peripheral devices and maintaining a database.

The book is written in intelligent English which assumes nothing more than a bit of common sense and perserverance on the part of the reader. Perseverance comes in useful because you have to enter several pages of data which lacks the customary checksum features of other books in the Compute! series.

An appendix of useful subroutines for incrementing, adding and subtracting double byte numbers, multi-byte addition and multiplication and division adequately cover areas which can be problematic to beginners.

Undoubtedly, the contents of this book offers great value for money to anyone interested in a good introduction to machine language.

Title: Tool Kit: Kernal
Author: Dan Heeb
Publisher: Compute! Books/ Holt Saunders
Price: £13.95

COMPUTE! GAZETTE IS A RATHER EXpensive American magazine which is a mine of information for Commodore, Apple and Atari users, and Compute!'s books of abstracts for each machine are always good value for money.

Tool Kit: Kernal may sound like a collection of utility programs but it is a description of the ROM kernal routines at the end of the memories of the C64 and Vic 20.

The book is not fully self-contained and Compute!'s Tool Kit: Basic, which deals with the Basic ROM, along with a full disassembly of the kernal memory would be a useful companion to help gain the full benefit from the wealth of information contained in this book.

Each chapter is a grouping of the various subroutines in 'family' groups. For example, all the tape I/O routines form a large chapter which not only describes the routines but explains the



way in which a tape file is structured. Other chapters deal in a similar way with interrupts and system reset, screen, serial I/O, RS-232 and principal kernal routines.

Apart from giving details of the subroutines and their relatives, there is a smattering of hints and tips and short useful programs which demonstrate how the kernal may be used within your own projects.

The routines are listed in memory order and abbreviated groupins in two final appendices but a more standard index would have improved the facilities offered by this very useful book.

SHELF

Bookworm, Eric Doyle, delves between the covers of the best Commodore books.

MAKING

Stuart Cooke takes a look at the Commodore Music Expansion System

THE COMMODORE 64 IS WELL known for its musical capabilities. In fact the sound is so good that some companies are manufacturing audio cassettes of computer music so that you can listen to computer music on your hi-fi!

Not satisfied with having a computer that has some of the best sound, Commodore, together with Music Sales, has gone even further and produced the *Sound Expander*.

The *Expansion System* consists of a small box which plugs into the cartridge port on either a Commodore 64 or 128. This small box will then give your Commodore the ability to play eight different notes at once together with a drum backing sound and numerous voices.

The Expansion System contains an FM Music Synthesis chip which produces all of the sounds. FM Synthesis is used in the very popular Yamaha DX7 synthesisers and gives your computer facilities very similar to these very expensive machines.

In Use

Obviously before you can use the interface you will have to put the sound through some sort of amplifier. Leads are provided with the interface so that you can put the sound through either a television or a monitor. The best sound reproduction is achieved by putting the sound through your hi-fi or a music amplifier, the sound output going from the interface to the AUX input on your hi-fi. The lead to do this is not included so you will have to buy your own.

Once the controlling software is loaded from either tape or disk you can make music.

The various options offered to you are chosen from pull down menus. The menus available are:

SETUP – which allows you to choose keyboard splits, single finger chords etc.

SYNTH – which allows you to choose which of the preset voices you are going to use.

RHTHYM – allows you to choose from one of the preset drum patterns.

RIFF – allows beginners to play tunes and listen to demo music.

DISK – available only to people who buy the disk version of the software. This allows you to load in new sounds and new music.

Using these menus is very simple. Use functions F1 and F3 to select the option that you want, then press F7 to 'pull down the menu'. Once the menu is down use the same keys to move up and down the menu and select the appropriate function. The only problem that I found with this is that there is no quick escape option. The EXIT menu function is always at the top of the list, if you want to change something at the bottom of the list then you must go down make the necessary change and then go back up to the top again to leave the menu. Very time consuming.

As previously mentioned the Setup menu allows you to set many useful parameters. For example you can split the keyboard wherever you want and have one sound playing on the left hand keys while another plays the right hand keys. This means that you could play a tune with an organ sound while you play the chords with a guitar sound.

You can take this even further by using auto chords. This function allows beginners to play chords by simply pressing a key. For example to play C Major press the C key. Both major and minor keys are available but unfortunately there are no sevenths.

If you select one of the rhythms and you have auto chording switched on, a backing track will automatically be added to the chords, this is great for beginners as they can play complete tunes with just two fingers, one for the tune the other for the chords.

The sounds offered from the SYNTH menu are pretty diverse and of exceptionally high quality. The voices range from a harpsichord through to a jazz organ so there is probably something to suit just about every tune you are likely to play. Disk users have the added benefit that they can load in a second set of voices from disk.

The rhythm section is quite good though it sounds a little tinny. It would be possible to use the sound expander on stage but on no account would you feel happy using the built in drum sounds.

If you have never touched a keyboard before you will love the RIFF option. When you choose this option each key has 'stored in it' a little tune. Pressing keys at random will link up to 255 of these 'tunes' together giving quite catchy tunes. Riffs that are available are Country, Pop and Disco. Disk users also have a big band sound option.

As I have previously stated, the interface allows you to play up to eight notes at once. The notes being played are represented on a musical scale on the screen. To actually play the notes you can either press keys on the keyboard, use an optional overlay as used with the Commodore Music Maker, or use an add-on keyboard.

The add-on keyboard is a five octave full size keyboard. It is fairly well made and has a very good 'feel' to it. People who are used to pianos and organs will be quite at home using it. If you are used to a piano it is worth pointing out that there is no touch sensitivity to the keyboard, no matter how hard you press a key the note still plays at the same volume.

Obviously a product like this has to have some bad points and it does. However, most of my gripes are over the documentation and the software NOT the interface itself.

The manuals can be described as barely adequate. There is information on each of the functions available but there is no information on how to program the interface yourself. OK so it may be complicated but surely there are people who would like to give it a go. Commodore will be releasing a package that allows you to generate your own sounds at a later date but it has yet to be seen if this will let you generate new voices for use with the keyboard.

This shouldn't be too difficult for the disk system but since the cassette version doesn't have a LOAD option I'm fairly certain that you won't be able to change the voices on the cassette version of the software.

MUSIC

The RIFF function is great fun but after a little while becomes a little boring, after all you wouldn't listen to the same record over and over again would you? My personal opinion is that the memory given over to this could have been used to offer a few more input options especially the option of more voices.

If you purchase the sound expander together with the full size keyboard then you will also get the *Commodore Sound Studio* thrown in. Being honest I can't quite understand why this program comes with the package as it is used for editing the C64's internal SID chip not the new sound chip.

The program basically gives you a synthesiser front panel and allows you to change parameters such as attack and decay very simply as well as allowing you to write tunes. The program isn't really that bad my personal opinion is that it is the incorrect one to be packaged with the keyboard.

Verdict

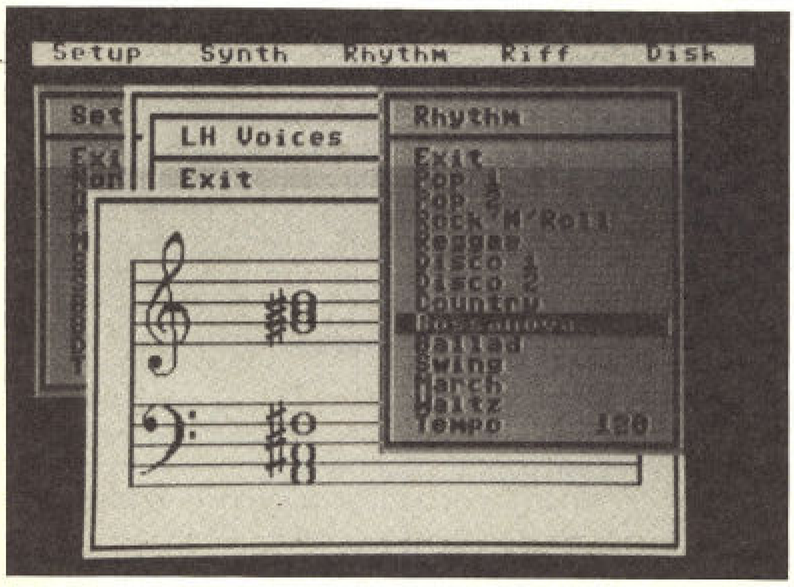
The Commodore Sound Expander in whatever form you purchase it can only be described as superb. OK so I've mentioned a few dislikes but it's good qualities far outweigh those.

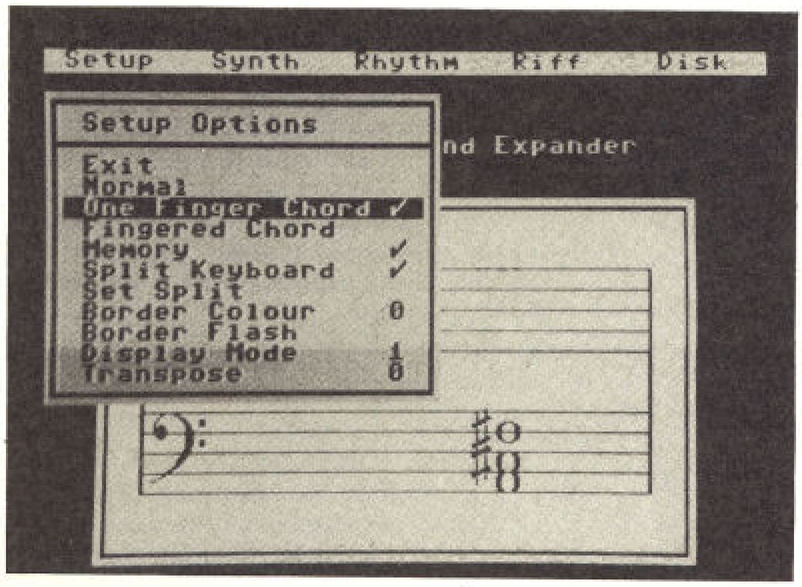
The keyboard and software reviewed here was seen by both professional musicians and people who have never touched a keyboard before, all were equally impressed.

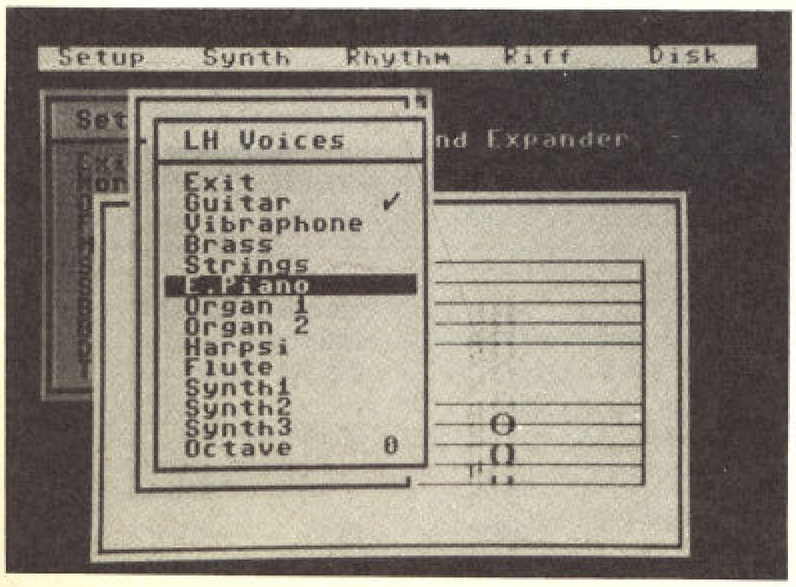
If you are thinking of taking up playing keyboards or would like to own one but until now have been put off by the price, dig deep and go and buy one of the available systems, you're sure not to regret it.

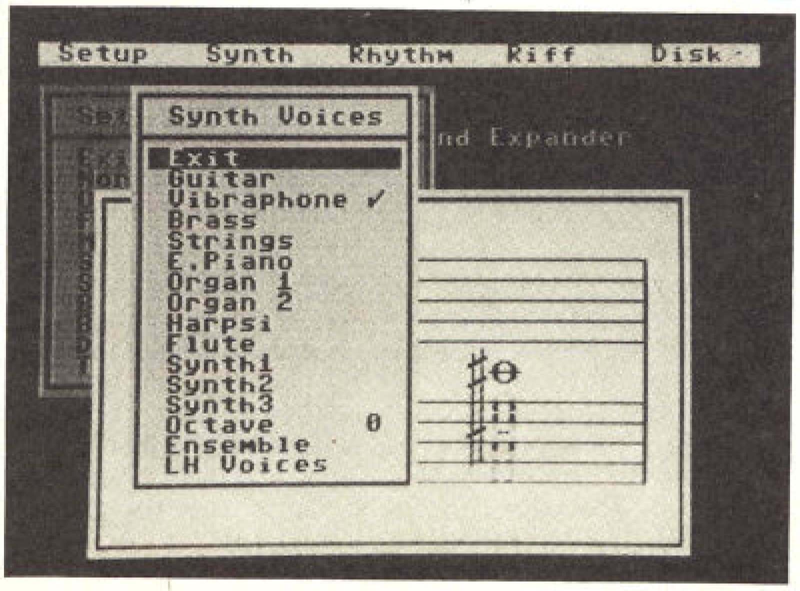
Touch Line

Sound Expander plus full size keyboard: £149.99
Sound Expander plus Commodore 64 and keyboard: £330.
Available from most Commodore dealers.









[redacted] 'CHIP

Eric Doyle crawls inside his Commodore to look at some chips.

A SMALL NUMBER CAN BE easily stored in a computer's memory but most programs use numbers which are outside the range of simple integers. Two byte integer values can only include whole numbers in the range of 32767 to -32768, so how does Basic deal with extremely large numbers or decimals?

The system used is known as floating point mathematics or scientific notation. In the decimal system of numbering any number can be expressed as a power of 10. For example, the number 10 is represented by 10 ↑ 1 or 1 × 10. One hundred becomes 10 ↑ 2 which is 1 × 10 × 10 and a thousand is 10 ↑ 3 (1 × 10 × 10 × 10).

Numbers between multiples are represented in the following ways:

20 × 10 ↑ 1 (2 × 10 = 20)
3.52 × 10 ↑ 1 (3.52 × 10 = 35.2)
5.6798 × 10 ↑ 2 (5.67 × 10 × 10 = 567.98)

You can see that converting a number to floating point format means dividing it repeatedly by 10 until the number is reduced to a value between one and nine. Then the number of divisions is written down as a power of 10. This process is called 'normalising' the number.

Values below one are normalised by multiplying them by 10 until the value lies in the range one to nine, as before. This time the number of multiplications are represented as a negative value of 10:

0.1 becomes 1 × 10 ↑ -1
0.00521 becomes 5.21 × 10 -3

In this form of notation 10 ↑ 0 has the value of one, so any number from one to nine is represented by a number multiplied by 10 ↑ 0.

The two parts of the floating point number are known as the mantissa and the exponent. The mantissa is the fractional number and the exponent is the power of 10.

Because the power is always a power of 10 the computer uses the letter E instead of printing 10 every time:

1.243E15

By now you will realise that the decimal place is detemined by the exponent. The name 'floating point' is derived from the fact that as the exponent is increased and decreased the decimal point floats forwards and backwards along the mantissa when the expression is converted to normal decimal notation.

Binary Power

This is all very well but there's a fly in the ointment. Computers use binary notation not decimal. Fortunately, the method is the same but to base two.

We have seen that normalising a decimal number means converting the number so that it lies between one and 10 or, to put it another way, one and the number base 10 minus one. Applying this to binary base two, a normalised number lies between one and the number base two minus one. So a normalised binary number always has a one before the decimal point.

When reading a byte from left to right the value of each successive bit in decimal is half of the previous bit in the series 8, 4, 2, 1. This series continues beyond the decimal point so, since binary one is the lowest whole number in the series and it equals one decimal, binary 0.1 is 0.5 decimal, binary 0.01 is 0.25 and 0.001 gives decimal 0.125.

The exponent lies in the decimal range 127 to -128 but this does not convert directly from the binary byte. Instead a binary value of zero means that the number is also zero in decimal. A decimal value of one converts to a value of -128, two is -127 and so on until 255 converts to +127. It follows that a real value of 129 is equivalent to an exponent of zero.

Prying Mantissas

The mantissa is not as straight forward as at first might seem probable. The first byte assumes an imaginary decimal point following the highest bit of the byte. We have discovered that any normalised number has a value greater than one but less than two, so we can always assume that the highest bit of this byte will be one. Using this fact, the computer uses this bit to signify positive and negative

Decimal	Binary	Normalised	
1.0	1.0	1.00	× 2 ↑ 0
2.5	10.1	1.01	× 2 ↑ 1
0.0625	0.0001	1.00	× 2 ↑ -4
5.375	101.011	1.01011	× 2 ↑ 2

Five bytes are used in memory to store floating point numbers. The first byte is the exponent and the following four bytes give the mantissa.

Exponent	Mantissa 1	Mantissa 2....etc
0100 0000	1(.)100 0000	0010 1001 ....

↑ sign bit assumed

↑ decimal point

CHAT'

numbers. A one in this position would mean a negative number and a zero signifies a positive value.

If the stored values are PEEKed an ordinary decimal value would result. Mantissa 1 would return a value of 192. To convert this to a mantissa value we must first evaluate the high bit by ANDing the location with 128. This gives 128 which means the bit is set and the number represented will be negative.

Next we must determine the value of the rest of the byte. ANDing with 127 will elminate the first bit and give 64. This is the first decimal place of the binary mantissa and equates with a value of 0.5 decimal. The maximum value which it could reach if PEEKed is 127. This is almost 128 which is double 64. If we divide our value by 128 we therefore get 0.5.

What if the third highest bit was set instead? ANDing with 127 would give 32 and dividing by 128 gives 0.25, so the system seems to work. This deals with Mantissa 1 and we now go on to consider Mantissa 2.

Imagine for the moment that this whole byte was an eight bit Mantissa 1 with only the highest bit set. The value would be 128. To make this equal to 0.5 we divide by 256. It can't be 0.5 in this position so we must divide again by 128. Similarly, Mantissa 3 is divided by 256, then again by 256 and finally by 128 to reveal its decimal value. Mantissa 4 is divided three times by 256 and once by 128.

This four-byte Mantissa gives an accuracy of approximately nine places which is accurate enough for most purposes.

The exponent is a power of two, ranging from -128 to 127:

2 ↑ 128 = 3.9 × 10 ↑ -29
2 ↑ 128 = 1.7 × 10 ↑ 38

This gives the maximum range of floating-point integers.

Peeking Out

A program to reveal the value of a stored floating point number would have to do four things.

Firstly, find where the variable is located. Secondly, evaluate the exponent. Thirdly, determine the sign of the final number and finally calculate the Mantissa. The following program does all of this:

```
PROGRAM:  FLOAT FINDER

100 A=-5.732
110 REM * BANK1 IN C128 MODE *
120 POKE 828,PEEK(71):REM * POKE 2816,PEEK(73) IN C128 *
130 POKE 829,PEEK(72):REM * POKE 2817,PEEK(74) IN C128 *
140 LO=PEEK(828)+PEEK(829)*256:REM * 2816,2817 IN C128 *
150 REM * PEEK FLOATING POINT BYTES *
160 FOR B=0 TO 4:P(B)=PEEK(LO+B):NEXT
170 REM * CALCULATE EXPONENT *
180 EX=2↑(P(0)-129)
190 REM * CALCULATE SIGN *
200 SIGN=(-1)↑((P(1)AND 128)/128)
210 REM * REMOVE SIGN BYTE *
220 P(1)=P(1)AND 127:REM 7 BITS
230 REM * CALCULATE FRACTIONAL PART *
240 FRACT=P(4)/256
250 FRACT=(FRACT+P(3))/256
260 FRACT=(FRACT+P(2))/256
270 FRACT=(FRACT+P(1))/128
280 REM * ADD ONE FOR MANTISSA *
290 MANT=1+FRACT
300 REM * CALCULATE VARIABLE
310 VAR=SIGN*EX*MANT
320 PRINT VAR
```

Functional Arrays

Defined functions are also stored as a kind of variable. The first two bytes are the function name. The following two bytes point to the actual location of the function definition in program memory. The location of the variable used within the function is pointed to by the next two bytes. The location is always within variable memory. The final byte does not signify anything and remains at value zero.

Arrays are stored in an area which begins where the variable data ends. Where is this? Well, how long is a piece of string? The start position depends firstly on how long the program is and, secondly, how many variables have been defined. As a new variable is encountered by the program, so the array memory moves up by seven bytes.

Arrays are as complex to store as they are to manipulate in a program. First a header must be created then a block of memory is put aside for all of the values liable to be created. The actual format can be seen in the tables at the end of this article.

Obviously, a vast amount of memory can be reserved for arrays and when you consider that this block has to be moved up seven bytes every time an ordinary variable is created, it is clear that this could slow the program noticeably. Some computers lack the ability to move the array area and all variables must be initialised in the first few lines of a program to obtain a fixed point for the start of arrays. Even though this is not necessary on a Commodore, it can be prudent, in cases where several arrays are used, to initialise integer, floating point, string variables with zero or null values before defining arrays. Also remember to define functions at this point too.

Get Organised

You will now see why memory is wasted when defining variables so that they all occupy seven bytes. It makes the moving of variables a lot simpler if a fixed space has to be created regardless of the variable type. This is crucial to chip memory management and many more examples of reserved memory will be seen in future articles as we progress through all of the computer's chips.

AMERICANA

Gordon Hamlett looks at US Gold's pocket money range.

WHEN BUDGET GAMES FIRST APpeared, they tended to be poor versions of Space Invaders and Pacman, written in Basic and sold in newsagents and garages with no product advertising and very low company profiles. It did not take long though for the major companies to see that there was a place in the market for games at a low price and soon they were re-releasing their old titles at a lower price in order to gain an increased shelf life and profit from their products.

With this increased respectability, it was always on the cards that US Gold, one of Britain's largest software distributors, would jump on the bandwagon. Americana is the title of the US Gold budget range. Nine titles have been released for the C64 in the initial launch and there is promise of some titles in the future for the C-16. As you would expect from US Gold, the packaging is slick with clear, plastic cases (unusual for the company) and a uniform colour scheme of yellows, reds and oranges. One of the criticisms levelled against US Gold has always been that the product has been too highly priced but I don't think that many people will be too disappointed if they pay £2.99 for one of these titles.

So what of the games themselves? They fall into two categories, some that have previously been released at a higher price and some that have never before seen light of day under a US Gold label.

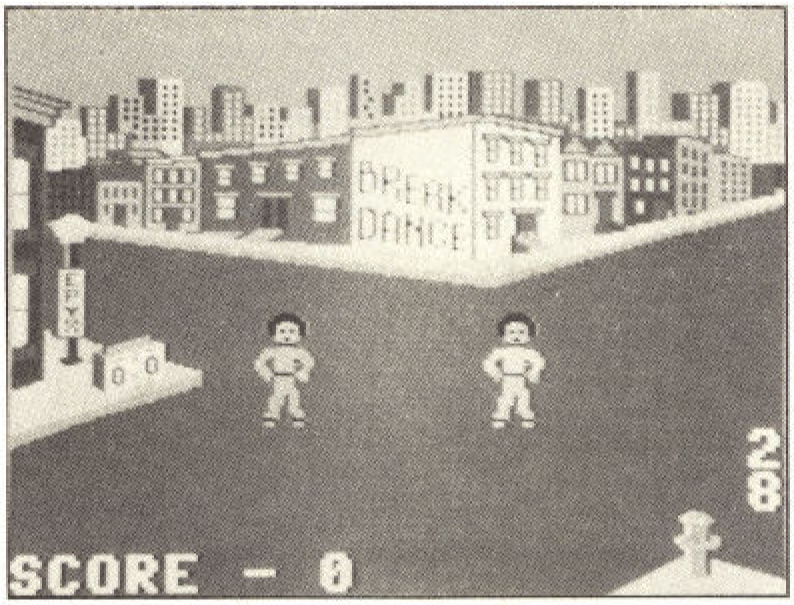
Pinball

Slamball is a pinball game that scrolls over four screens. You must knock down 37 targets with five balls in order to progress on to the next screen. There are four sets of flippers to manipulate and you can "nudge" the machine a limited number of times as you endeavour to keep the ball in play. An unusual feature is the two player option which is not as you may think, a head to head confrontation, but one player controlling the flippers and the other the nudges. I found this game highly addictive, and my favourite amongst the titles released so far.

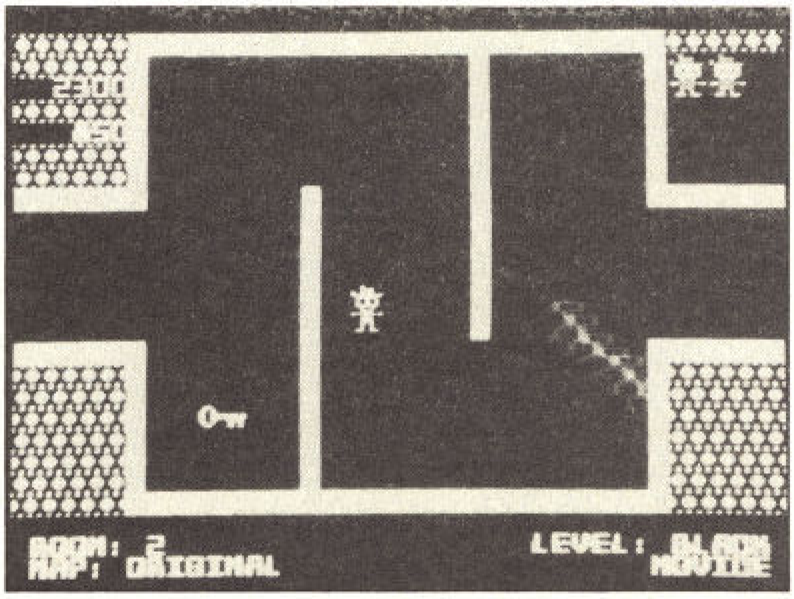
Adventuring

Scrolls of Abadon is an arcade adventure that at first sight looks like a Pacman derivative but there is a lot more to it than that. You must explore a series of rooms searching for the four pieces of all the gems that are lying around whilst avoiding the nasties. The more you move round the screen, the more you restrict your future movements as by picking up the gems, you put down

Left to right: Breakdance, Sentinel, Slamball



Left to right: Shamus, Neutral Zone, Ollies Follies



some directional arrows that must be followed. There are also scrolls to collect that contain spells to help you on your way.

Arcadia

Ollie's Follies is a one or two player, 24 screen platform game, reminiscent of a cut down version of Bounty Bob. On each screen, you must collect a key and make your way to the exit whiilst leaping around the various obstacles. Robots pursue you relentlessly although if you pick up an object, you have a limited amount of time in which to destroy them. There is the usual selection of teleports, lifts and lasers to be overcome.

Moon Shuttle is a space shoot-em-up game in which you battle your way through alternate screens of marauding aliens and asteroid belts. There are several varieties of aliens including blob men, expandos, and bomb launchers. Ther asteroid belt is solid and you blast a way for your ship to pass safely through it. At higher levels, the asteroids move considerably faster.

Another space arcade game is *Neutral Zone* where you are in charge of a perimeter gunnery pod, trying to defend your early warning station Alpha IV. You are given warning as to which direction the next enemy ship is approaching from and must try to destroy it as quickly as possible. There are five difficulty levels to choose from and your score is determined not only by the number of enemies that you destroy, but also the length of time that you took to do it.

Street Life

New York City is a strange sort of game where the object is to go round visiting various sights such as the Empire State Building and the city Zoo. You can drive round the city or walk or use the subway. You will need to eat and get money from the bank in order to pay for your car repairs etc. At all these locations, there is a platform type game to solve before you are allowed to proceed. If you crash your car, you get taken to the hospital whilst the car goes to the garage and all of the costs time and money. The entire game must be completed within a certain time period.

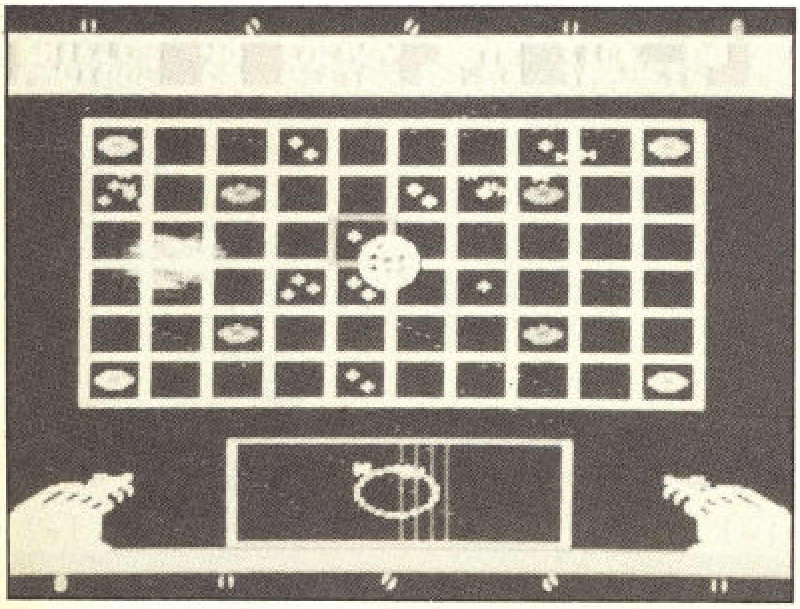
All Sorts

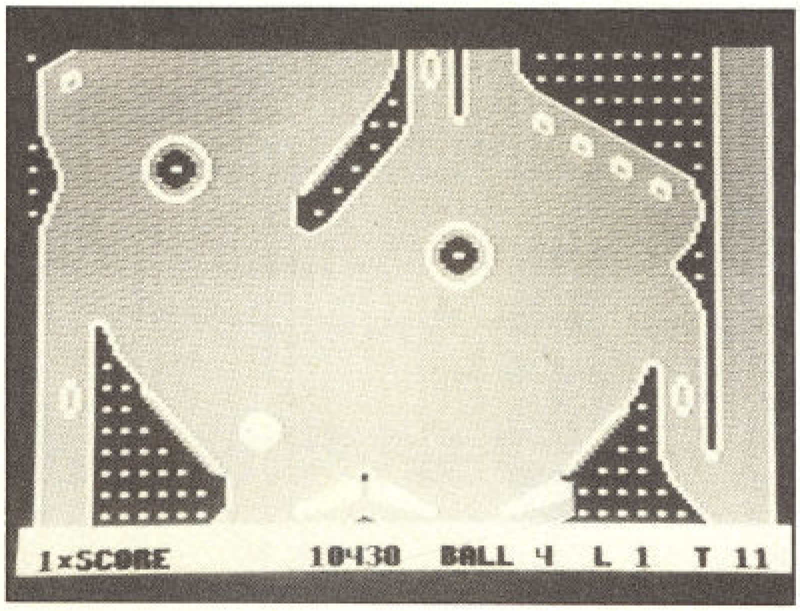
Shamus is a Beserk type game which sees you trying to penetrate the Shadow's lair and destroy him. You must explore the mazes searching for colour coded keys that allow you access to further levels. All this must be done whilst defending yourself against the assorted intruders. There are extra lives to be gained either by collecting bottles or by risking walking over a question mark and there is the continual threat of the shadow to be overcome – he can't be killed, only stunned if he comes chasing after you.

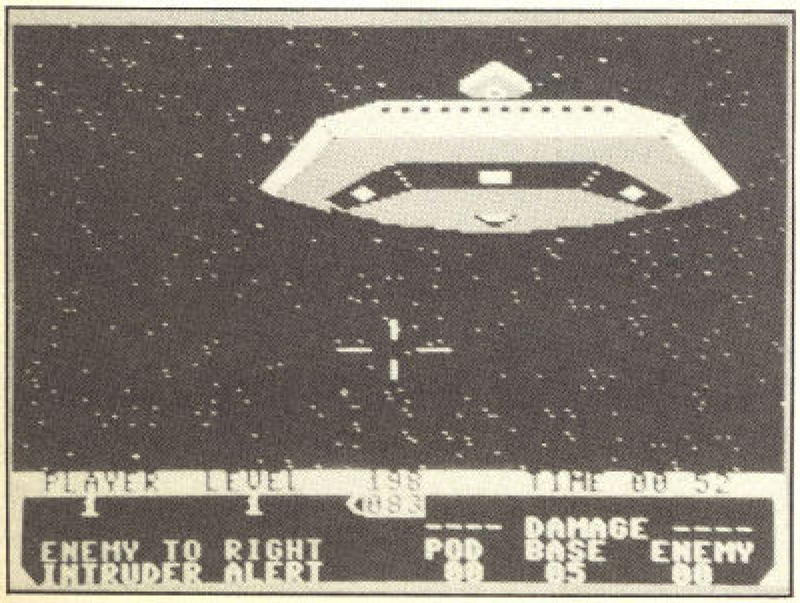
Sentinel is a Start Trek/Star Raiders variant. A map of the stellar grid displays both friendly and enemy forces and you must warp into the appropriate quadrant to do battle with the foe in an arcade type sequence. There are long and short range scanners to help you find the enemy and you must navigate through asteroid fields as you travel in hyperspace to your destination. You must also find friendly bases where you can dock, refuel and rearm.

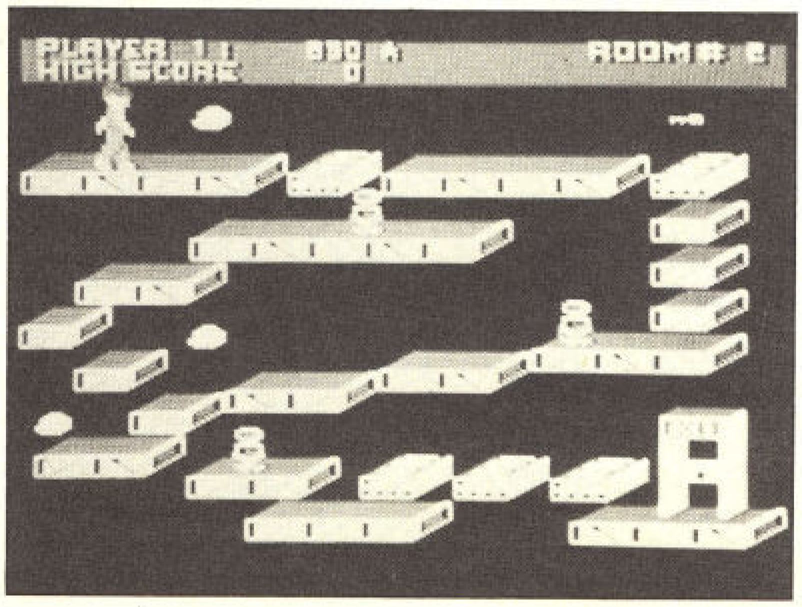
The final game to be released is Breakdance. In this you can select from four different variants as you try to prove to rival gangs that you are a better dancer than they are. This involves watching the computer opponent make a move and then copying it. If you get that right, you get a sequence of two moves to reproduce, then threee, then four and so on. Yes, it's no more than a variant of Simon, one of the first ever electronic games. This one's only likely to appeal to dance fans.

Well, there you have it. Nine games, none of them really bad and all representing good value for money. Yet another winner from US Gold.

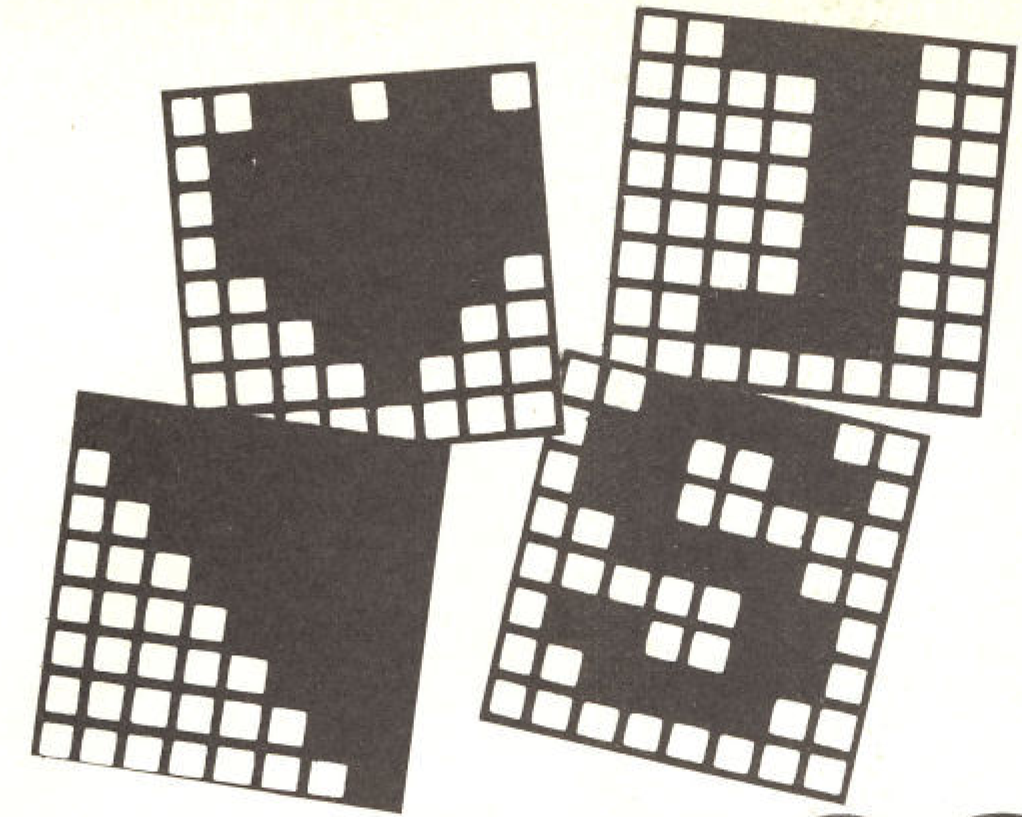








Listings will be much easier to enter with our new system.



LISTINGS

COMMODORE LISTINGS ARE RATHER well known for the horrible little black blobs that always abound. Unfortunately the graphics characters which are used to represent graphic and control characters do not reproduce very well and they are also difficult to find on the Commodore keyboard.

In future all control and graphics commands will be replaced by a mnemonic within square brackets. This mnemonic is not typed out as printed in the magazine but rather the corresponding key or keys on the keyboard are pressed. For example [RIGHT] means press the cursor right key, you do not type in [RIGHT]. All of the keywords, what keys to press and how they are shown on the screen are shown below.

Any character that is accessed by pressing shift and a letter will be printed as [Sletter].

[SA] shift and A
[S+] shift and +

Any character that is accessed by pressing the Commodore key and a letter will be printed as [Cletter]

[CA] Commodore and A
[C+] Commodore and +
[C1] Commodore and 1

If any characters are repeated the mnemonic will be followed by a number. This number is how many times you should enter the character. Any number of spaces over one will also be represented in this form

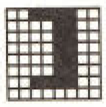
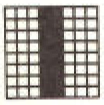
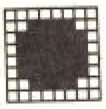
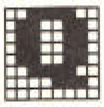
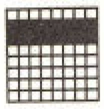
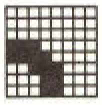
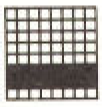
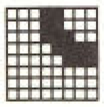
[RIGHT10] press cursor right 10 times
[C+10] press Commodore and + 10 times
[SPC10] Press the space bar 10 times

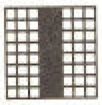
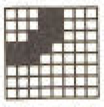
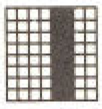
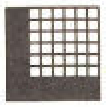
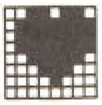
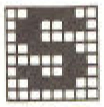
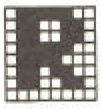
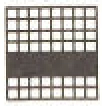
Any other characters should be easily recognisable for example CTRL-N means press CTRL and N and LEFT-ARROW means press the left arrow.

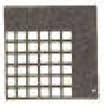
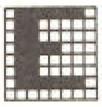
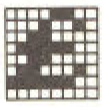
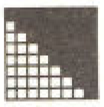
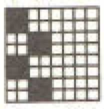
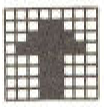
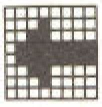
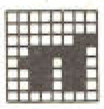
Any number of mnemonics can be enclosed in brackets for example

[SA10,SPC10,SA10]

means type 10 shift A's 10 spaces and another 10 shift A's.

Mnemonic	Symbol	what to press
[RIGHT]		left/right
[LEFT]		shift left/right
[UP]		Shift & up /down
[DOWN]		up/down
[F1]		f1
[F2]		shift & f1
[F3]		f3
[F4]		shift & f3

Mnemonic	Symbol	what to press
[F5]		f5
[F6]		shift & f5
[F7]		f7
[F8]		shift & f7
[CLEAR]		shift & CLR /HOME
[HOME]		CLR/HOME
[RVSON]		CTRL & 9
[RVSOFF]		CTRL & 0

Mnemonic	Symbol	what to press
[BLACK]		CTRL & 1
[WHITE]		CTRL & 2
[RED]		CTRL & 3
[CYAN]		CTRL & 4
[PURPLE]		CTRL & 5
[GREEN]		CTRL & 6
[BLUE]		CTRL & 7
[YELLOW]		CTRL & 8

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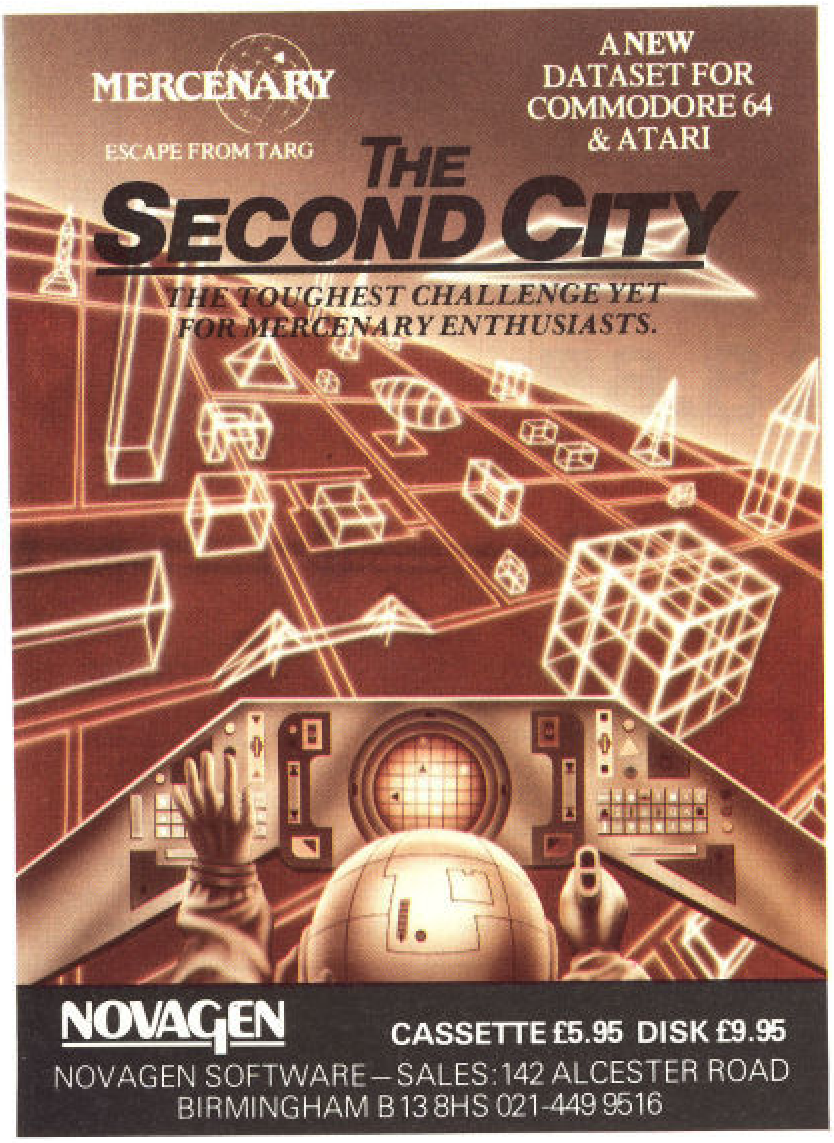
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Bill Bremner gets in a spin with his disk drive.

FAST FORMATTER

FAST FORMATTERS HAVE been commonplace on the C64 ever since the 1541 was added to the growing range of peripherals. Almost every function to do with the 1541 seems to be synonymous with a snail, and the standard 1.5 minute 'N0:'' FORMAT routine does little to help.

However, if the format routine is studied in depth, the reason for this sluggishness is made clear. There is a trade-off point in disk drives between speed and reliability: the faster you make operations such as data transfer and read/write operations, the larger the chance of data errors. The format routine used in the 1541 is designed to divide the disk surface into tracks and sectors, supplying a working area that allows the Disk Operating System selective data storage. Gaps are supplied between sectors and sector headers to allow for variations in the drive motor speed.

However, individual 1541s often run at different speeds, and although the difference is very small, occasionally problems arise due to sector over/under-writing. Commodore originally opted to use a fixed length gap between the end of one sector and the start of another (DOS 1-0), but this eventually lead to read and write errors. Later versions of DOS formatting (Including the 1541) were rewritten to allow for these speed fluctuations, achieved by writing a unique series of marks along a track.

These marks are timed and the results are divided by the number of sectors on the track to calculate the tail gap length. The same track is then re-erased, formatted and verified. This results in each track passing under the read/write head about 10 times, or two seconds.

Obviously, by-passing the timing routine and inserting a single constant for all the tail gaps on the disk would reduce the formatting time by about half. By cutting out this routine various fast formatters (that includes fast copiers with built in formatters) achieve their high speed, however they often take out the verify routine as well. Using a formatter which calculates the tail gap is more reliable simply due to the fact that the format is biased towards the performance of your drive.

The format routine I have written cuts down the formatting time by calculating the tail gap only when a new Zone barrier is reached. The way the DOS format routine works makes it easy for us to insert a simple patch. The FORMAT routine at $C8C6 sets up a JMP $FAC7 in buffer # 3 ($0600), and activates formatting by storing an EXECUTE ($E0) Job Code in $0003, providing for continuous monitoring of the writing.

What we have to do is copy the first part of the set-up at $FAC7 into a buffer unused during formatting. We can then insert a small machine-code routine to check what track the head is on, and if it's the start of a Zone continue where the original code left off. Otherwise, the routine JMPs straight to the track format routine at $FC36, by-passing the timing section.

A "UC:" (JMP $0500) command is used to activate the routine inside the drive RAM, as well as providing a similar structure to the "NO:" command, to eliminate the disk name/id parsing problems.

Good luck, and be careful when typing in the program since hitting a wrong key is one of the commonest errors which amateur typists make!

PROGRAM: FAST FORMATTER

```
100 POKE 53280,11:POKE 53281,11
    :PRINT"[CLEAR]"
110 PRINT"[YELLOW,RIGHT4]
    FAST FORMAT V1.0 BY BILL BREMNE
    R"
120 PRINT"[RIGHT4]----------------
    ------------"
130 PRINT"[DOWN,SPC4]
    45 SECONDS-FULL VERIFY"
140 PRINT"[SPC7]-TAIL GAP CALCULAT
    ION"
150 INPUT"[DOWN2,SPC4]DISK NAME
    :";NA$
160 INPUT"[DOWN,SPC6]DISK ID:";ID$
170 OPEN 15,8,15:HI=5:FOR LO=0 TO 3
180 C$="M-W"+CHR$(LO*26)+CHR$(HI)+
    CHR$(26)
190 FOR B=1 TO 26:READ BY
    :C$=C$+CHR$(BY):NEXT
200 PRINT#15,C$:NEXT
210 PRINT#15,"M-W"+CHR$(7)+CHR$(28
    )+CHR$(1)+CHR$(32)
220 PRINT#15,"UC:"+NA$+","+ID$
230 PRINT#15,"M-W"+CHR$(7)+CHR$(28
    )+CHR$(1)+CHR$(58)
240 CLOSE 15:END
250 DATA 160,68,185,199,250,153,0,4
260 DATA 136,16,247,160,100,185,25,
    5
270 DATA 153,69,4,136,16,247,76,91
280 DATA 4,160,3,165,34,217,87,4
290 DATA 240,6,136,16,248,76,54,252
300 DATA 76,12,251,31,25,18,1
310 DATA 169,11,141,42,2,169,0,141
320 DATA 1,2,32,238,193,172,123,2,
    185
330 DATA 0,2,133,18,185,1,2,133
340 DATA 19,169,1,133,128,169,1,32
350 DATA 211,214,169,224,133,1,165,
    1
360 DATA 48,252,32,228,200,238,122,
    2
370 DATA 238,122,2,76,64,238,234,
    234,234
```

Joe Nicholson improves the C-16's hi-res memory.

PROGRAMMING THE C16

AS EVERY C-16 OWNER knows only too well, when the computer is in high resolution mode only 2K is available for Basic. This article shows how the available memory can be doubled using assorted trickery.

When the hi-res screen is in use, the low-res screen is of course not needed unless you use the split screen option in GRAPHIC modes 2 and 4. Therefore it should be possible to overwrite this low-res memory area when using the hi-res screen. The problem is that when you are writing the program to run on the hi-res screen you need to use the low-res screen!

So, in theory, it is not possible to have a hi-res screen with colour and attributes without a low-res screen. This also means that you only get a miserable 2K for Basic.

The Method

The method we are going to use for 4K involves a machine code routine which moves the Basic up and down depending on whether or not you are in the hi-res mode. The memory maps for each mode are shown in the two sections of Figure 1.

This method works on the principle that, although it is necessary to have complete hi-res and low-res screens, because only one screen is displayed at a time, it does not matter if the Basic is moved down into the low-res screen memory when the hi-res screen is active, and up into the colour and luminance memory of the hi-res screen when the low-res screen is active. The program is therefore moved down and up by 2048 bytes.

But why not simply move the 2K hi-res colour and luminance maps down into the low-res screen and attributes block ? In theory this should work (the Commodore-64 uses the low-res area for the hi-res colours when in hi-res mode) as it is possible to move the colours and attributes table around by POKEing bits 3 to 7 of register 65300 ($FF14 hex) with the top 5 bits of the high byte of the address of the table.

In effect this enables the position of the table to be in any 2K block starting at 0K, 2K, 4K etc. Note that because of the way that the C-16 interrupt service routine continually rePOKEs this address this address with the value stored in $07FB, it is more effective to POKE bits 3 to 7 of address $07FB (2043 decimal, the 'VM base mask for split screen') while in hi-res. Although the 2K colour+luminance area does move with this POKE, hi-res commands such as CIRCLE, DRAW, SCNCLR and BOX still think the colour and luminance maps are stored in their old positions. This means that the hi-res Basic commands still address the 2K block starting at 6144, overwriting any program stored in this area.

Thus, although it is in theory possible to merge the low-res screen and hi-res colour+luminance maps together, the C16 does not allow you to use any of its Basic commands. This method would still work with machine code programs though, and also means that the code would not have to be re-locatable as the program would not have to move.

As this method would be useful to machine coders, the memory map of the system is shown in Figure 2. Note the resemblance this system has to the C64 memory layout for the hi-res screen. It could prove useful in adapting C64 machine code programs on to the C-16.

The other 'possible' method of getting extra memory would be to move the low-res screen and attributes up into the hi-res screen colour and luminance tables. This should be possible by POKE65300,24 while in low-res mode – although for this to work the machine's own interrupt service routine has to be disabled first. Unfortunately, again the C-16 still attempts to use the low-res screen at 2048 and writes to that area making your program look like a Chinese Takeaway menu card. You could use this method for machine code I suppose, but I can't see any particular advantages with it.

So the only way of getting 4K for Basic appears to be to move the program up or down whenever you want the low-res or hi-res screens.

A bit of a mess? Not really as it is now possible to use the hi-res GSHAPE and SSHAPE commands for instance (which can occupy up to 256 bytes per shape) and still have room for a useful Basic program. With only 2K of memory there was not much point in having these commands in the machine at all. Also the transition up or down takes place in a flash – literally.

Figure 3 shows the assembly text for the moving routine. This is based on the

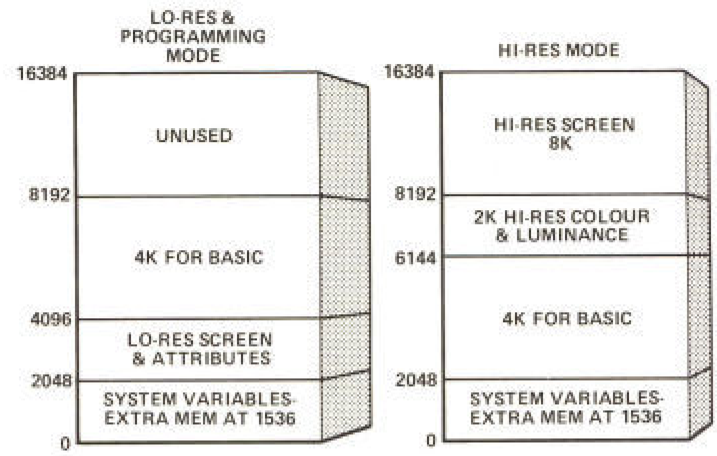


Figure 1. Memory maps for moving BASIC.

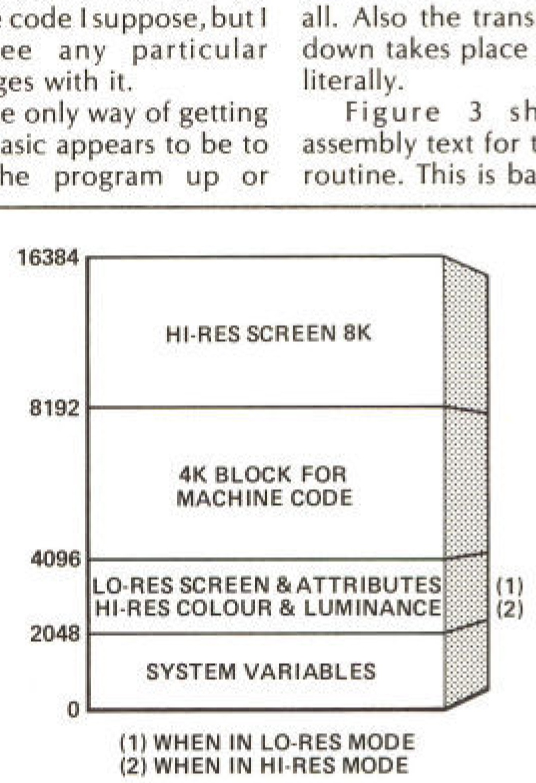


Figure 2. Memory map for machine code.

C-16 Assembler which appears in the June 1985 issue of *Your Commodore*. If you haven't got this assembler up and running, the code is in DATA statements in Figure 4. Type this in and RUN to POKE the code into memory.

The routine occupies 230 bytes starting at $0600 (5136 decimal) in a portion of memory not used by the C-16. This space is not available to Plus-4 owners, but they wouldn't need to do this memory juggling anyhow, would they?.

The Program

The program contains three routines: (1) set the top of Basic pointer to 8191 to have 4K of Basic, (2) move Basic down 2048 bytes to go into hi-res mode, and (3) move Basic up to 4096 again to go into low-res mode.

The 'set pointers to 4K' routine is at address 1698 ($06A2).
The 'move Basic down' routine is at address 1536 ($0600).
The 'move Basic up' routine is at address 1618 ($0652).

Now follows a line-by-line explanation of the program so everyone can marvel at just how clever it all is!

Explanation

Lines 11000-11480 hold the MOVBASICDOWN routine.
Lines 11000-11160 set the old and new start of Basic pointers for the relocate routine at lines 11200-11250. $D0-$D1 contains the old start at 4096 ($1001), and $D"-$D3 contains the new start at 2048 ($0800).
Lines 11200-11250 move the Basic down one page (256 bytes) at a time calling the BLOCKMOVE routine at line 12000 to actually move each 256 byte block.
Lines 11270-11280 set a vector for subtracting from the high byte of the pointers (such as the start of Basic pointer), setting it to $8 as in this case means that the pointers will move down 2K (in the start of Basic pointer example, the pointer will change from $1000 to $0800).
Lines 11285 sets the start of Basic for the line link address changing to $0800 (2048, the new start of Basic).
Lines 11290 calls the 'Relocate line links' routine (RE) at line 14000.
Lines 11300-11478 change all the relevant system pointers so that the machine can carry on as usually whether the whole of Basic has been moved up or down. Note that this code is used by the MOVEBASICUP routine (line 11500) also.
Lines 11300-11390 change all the pointers that are between $2B and $38 using a machine code loop. The pointers changed are:

The 'start of Basic test' pointer at $2B-$2C.
The 'start of Basic variables' pointer at $2D-$2E.
The 'start of Basic arrays' and 'end of Basic arrays+1' pointers at $2F-$30 and $31-$32 respectively.
The 'bottom of strings' pointer at $33-$34.
The utility string pointer at $36-$36.
The 'highest address used by Basic' pointer at $37-$38.

Lines 11400-11478 change all the other pointers at old places in memory.
Lines 11400-11425 change the 'current DATA item address pointer' at $41-$42.
Lines 11430-11438 change the 'current Basic variable data' pointer at $47-$48.
Lines 11440-11470 change the 'Text pointer' at $3B-$3C.
Lines 11472-11478 change the 'OPPTR' pointer at $4B-$4C.
Lines 11480 then jumps to the 'RELOCATE STRING LINKS' (RS) routine at line 16000.
Lines 11500-11730 are the

FIGURE 3

```
START: 10000  ;RELOCATE BASIC
 10010  ;(C)1986 JOE NICHOLSON
 10020  ORG $0600
 11000  ;MOVE BASIC DOWN
 11100  LDA #0
 11110  STA $D0
 11120  STA $D2
 11130  LDA #$10
 11140  STA $D1
 11150  LDA #$08
 11160  STA $D3
 11200  :DL JSR :BM
 11210  INC $D1
 11220  INC $D3
 11230  LDA #$18
 11240  CMP $D3
 11250  BNE R:DL
 11270  LDA #$8
 11280  STA $D4
 11285  STA $D3
 11290  JSR :RE
 11300  :CP LDX #0
 11310  :DP LDA $2C,X
 11320  SEC
 11330  SBC $D4
 11340  STA $2C,X
 11350  INX
 11360  INX
 11380  CPX #14
 11390  BNE R:DP
 11400  LDA $42
 11410  SEC
 11420  SBC $D4
 11425  STA $42
 11430  LDA $48
 11434  SEC
 11436  SBC $D4
 11438  STA $48
 11440  LDA $3C
 11450  SEC
 11460  SBC $D4
 11470  STA $3C
 11472  LDA $4C
 11474  SEC
 11476  SBC $D4
 11478  STA $4C
 11480  JMP :RS
 11500  ;MOVE BASIC UP
 11510  LDA #0
 11520  STA $D0
 11530  STA $D2
 11540  LDA #$17
 11550  STA $D1
 11560  LDA #$1F
 11570  STA $D3
 11600  :UL JSR :BM
 11610  DEC $D1
 11620  DEC $D3
 11630  LDA #$0F
 11635  CMP $D3
 11640  BNE R:UL
 11700  LDA #$FB
 11710  STA $D4
 11712  LDA #$10
 11714  STA $D3
 11720  JSR :RE
 11730  BEQ R:CP
 12000  ;BLOCK MOVE
 12100  :BM LDY #0
 12150  :BL LDA ($D0),Y
 12160  STA ($D2),Y
 12170  INY
 12180  BNE R:BL
 12190  RTS
 14000  ;RELOCATE LINE LINKS
 14050  :RE LDA #$01
 14060  STA $D2
 14090  :RL LDY #1
 14100  LDA ($D2),Y
 14110  SEC
 14120  SBC $D4
 14140  STA ($D2),Y
 14200  TAX
 14210  LDY #0
 14220  LDA ($D2),Y
 14230  STA $D2
 14240  STX $D3
 14300  LDA ($D2),Y
 14310  INY
 14320  ORA ($D2),Y
 14330  BNE R:RL
 14340  RTS
 15000  ;SET UP END OF BASIC
 15010  ;ADDRESS INITIALLY
 15100  LDA #$1F
 15110  STA $34
 15120  STA $38
 15130  LDA #$FF
 15140  STA $33
 15150  STA $37
 15160  RTS
 16000  ;RELOCATE STRING LINKS
 16100  :RS LDA $2D
 16110  STA $D0
 16120  LDA $2E
 16130  STA $D1
 16200  :R4 LDA $D0
 16210  CMP $2F
 16220  BNE R:R1
 16250  LDA $D1
 16260  CMP $30
 16270  BNE R:R1
 16280  RTS
 16300  :R1 LDY #0
 16310  LDA ($D0),Y
 16320  BMI R:R2
 16350  INY
 16360  LDA ($D0),Y
 16370  BPL R:R2
 16400  LDY #4
 16410  LDA ($D0),Y
 16420  SEC
 16430  SBC $D4
 16440  STA ($D0),Y
 16500  :R2 LDA $D0
 16510  CLC
 16520  ADC #7
 16530  STA $D0
 16540  BCC R:R3
 16550  INC $D1
 16560  :R3 CLC
 16570  BCC R:R4
```

FIGURE 4

```
10000 A=1536:DO:B=0:FORC=1TO16:READD:IFD=-1THENPRINT"OK..":END
10010 B=B+D:POKEA,D:A=A+1:NEXT:READD
10020 IFD<>BTHENPRINT"DATA ERROR IN LINE";PEEK(63)+256*PEEK(64):END:ELSELOOP
20000 DATA 169,0,133,208,133,210,169,16,133,209,169,8,133,211,32,122, 2055
20010 DATA 6,230,209,230,211,169,24,197,211,208,243,169,8,133,212,133, 2593
20020 DATA 211,32,132,6,162,0,181,44,56,229,212,149,44,232,232,224, 2146
20030 DATA 14,208,243,165,66,56,229,212,133,66,165,72,56,229,212,133, 2259
20040 DATA 72,165,60,56,229,212,133,60,165,76,56,229,212,133,76,76, 2010
20050 DATA 175,6,169,0,133,208,133,210,169,23,133,209,169,31,133,211, 2112
20060 DATA 32,122,6,198,209,198,211,169,15,197,211,208,243,169,248,133, 2569
20070 DATA 212,169,16,133,211,32,132,6,240,170,160,0,177,208,145,210, 2221
20080 DATA 200,208,249,96,169,1,133,210,160,1,177,210,56,229,212,145, 2456
20090 DATA 210,170,160,0,177,210,133,210,134,211,177,210,200,17,210,208, 2637
20100 DATA 231,96,169,31,133,52,133,56,169,255,133,51,133,55,96,165, 1958
20110 DATA 45,133,208,165,46,133,209,165,208,197,47,208,7,165,209,197, 2342
20120 DATA 48,208,1,96,160,0,177,208,48,14,200,177,208,16,9,160, 1730
20130 DATA 4,177,208,56,229,212,145,208,165,208,24,105,7,133,208,144, 2233
20140 DATA 2,230,209,24,144,209,0,0,0,0,0,0,0,0,0,0, 818,-1
```

'MOVE BASIC UP' routine.
Lines 11500-11570 set the pointer for the move to the end of the old and new Basics this time.
Lines 11600-12640 moves the memory up one page (256 bytes) at a time.
Lines 11700-11710 sets the 'change pointer' vector $F4 to F. As in the 'move BASIC down' routine $08 was assigned to $04. When the high byte of the pointers have $F8 subtracted from them, this is the equivalent of adding $08 to the high byte i.e. moving up the pointer by good bytes.
Lines 11712-11714 set the start of Basic to 4096 for the 'relocate line links' routine.
Line 11720 calls the 'relocate line links' routine.
Line 11730 jumps back to 11300 to change the pointer and relocate the string links.
Lines 12000-12190 the 'BLOCK MOVE' routine that relocates one page of memory (256 bytes). This is used by both the 'MOVE BASIC UP' and 'MOVE BASIC DOWN' routines.
Lines 14000-14340 are the 'RELOCATE LINE LINKS' routine (each line of Basic has a two byte link pointer which points to the next line of Basic).
All these links must be altered when Basic is relocated).
Lines 14050-14060 set the 'low byte of the start of Basic' pointer to 1, so that the start of Basic is at 4097 or 2049 (the first byte at 4096 or 2049 must be 0).
Lines 14090-14100 gets the high byte of the line link.
Lines 14110-14120 alter the high byte to its new value.
Line 14140 stores the answer.
Line 14200 saves the new high byte of the link.
Lines 14210-14220 get the low byte of the link.
Lines 14230-14240 set the value of the line link to equal the new value stored in the line link i.e makes it point to the next line link.
Lines 14300-14330 jump back to line 14090 to change the next line link only if the new link address is not zero, if it is zero then the end of Basic has been reached and line 14340 returns from the routine.
Lines 15000-15100 are the 'set end of Basic pointers up to 4K' routine.
Lines 15100-15160 store the new end of Basic ($1FFF or 8191 decimal) in the 'bottom of string storage' and 'highest address used Basic' pointers.
Lines 16000-16130 puts the 'start of string' pointer into bytes $D0 and $D1.
Lines 15200-16280 check to see whether the pointer at $D0-$D1 has reached the end of the variable area, if so then Return. Note that as this routine is jumped to last of all, the RTS returns to Basic to resume execution.
Lines 16300-16320 check to see if the first byte of the name of the variable has +128 added to it, if it has it is not a string variable and it jumps to line 16500.
Lines 16350-16370 check to see if the second byte of the name of the variable has +128 added to it. If it hasn't then it is not a string variable and it jumps to line 16500. If all the conditions for a string variable are met however, the high byte of the string link address is altered to its new value in lines 16400-16440.
Lines 16500-16550 advance the pointer to the next variable.
Lines 16560-16570 jump to analyse the next variable.

Demo

Figure 5 shows a short demonstration program. Lines 100-120 are really protection instructions. This is necessary because, if the C-16 encounters an error in the program it will switch back to low-res mode and print the error on the screen, so overwriting your Basic program. These instructions however overcome the problem. A TRAP is set up so that when the C-16 encounters an error it goes to line 110 to do all the necessary moving up of Basic etc, so that your program is not overwritten. Line 110 selects low-res and moves Basic back up again to 4096, if it was located at 2048 when the error was encountered. Line 120 prints the error along with the line number of the error and then ENDs. Note the GOTO in line 100 points to where the actual program starts.

Because of the complexity involved in relocating, it is not possible to use string arrays when this system is working, although you can use normal variables, strings, and integer and floating point variable arrays. This should not prove much of a problem though, and I can assure you that it would take a lot more work and code to overcome this limitation.

The first long awaited application should be a hi-res program which also includes GSHAPE and SSHAPE for cutting and pasting on the screen etc. and I hope a reader will write one and send it to be published in this magazine. Unfortunately it is not possible to SAVE your artwork at the moment, as going into the monitor to save the code for the hi-res screen would bring you back into low-res and so overwrite the colour and luminance tables of the hi-res screen. A suitable save routine will be presented as part of a future article in this series.

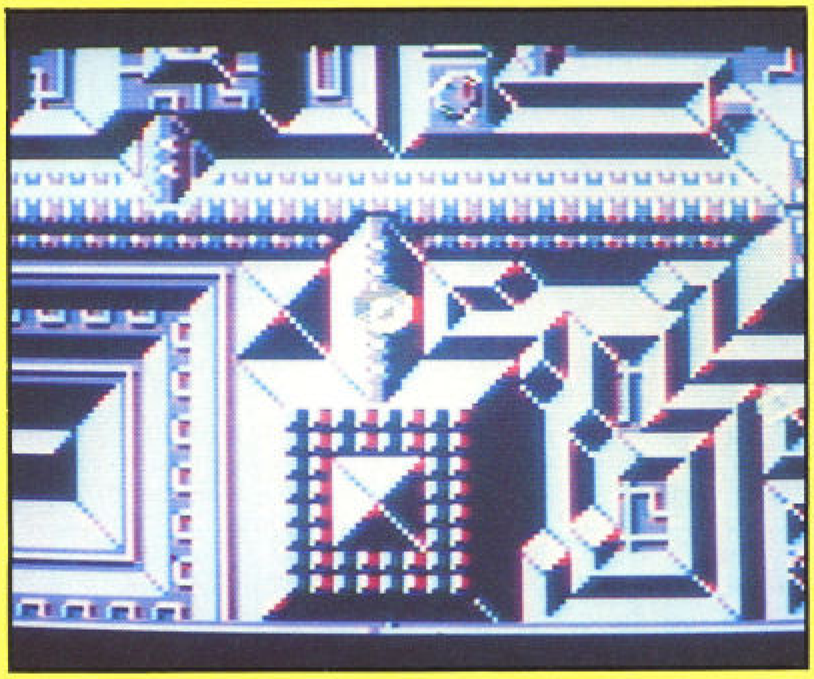
I hope these routines have proved interesting and you will soon be on the way with hi-res StarTreks, Elites and other Basic hi-res epics on the massive 4K C-16.

FIGURE 5

```
100 SYS1698:TRAP110:GOTO150
110 GRAPHIC0:IFPEEK(44)=8THENSYS1618:SCNCLR
120 PRINTERR$(ER),EL:END
150 SYS1536:GRAPHIC1,1:DIMA%(40,40):A%(20,20)=1234
160 T$="THIS IS T$ DEFINED IN HI-RES MODE":CHAR,0,0,T$
170 FORB=1TO15:COLOR1,B,5:FORA=0TO85STEP15
180 BOX,86,45,186,145,A:NEXT:NEXT
190 COLOR1,3.4:CHAR.14,9,"WHAT A":CHAR,12,11,"MARVELLOUS",1
200 CHAR,15,13,"DEMO":CHAR,0,22,"ANY KEY...
250 GETKEYA$:SYS1618:GRAPHIC0,1
260 PRINT"A%(20,20)=";A%(20,20):PRINT:PRINTT$
```

OLLO I & II
Bug-Byte C64 + Joystick

Originality 7 Playability 4 Graphics 4 Value For Money 3



CHALLENGING FAST ACTION with superb background graphics are a feature of this shoot 'em up space game from Bug-Byte.

In part one you have to pilot a craft across various landscapes blasting everything that appears on the screen, dodging and weaving to avoid collision with your prey. The background animation looks stunning as it scrolls in sympathy with the movement of the spacecraft.

Ollo II is equally as challenging but has more purpose to the game. It bears an incredible resemblance to Alligata's Z but I shan't hold that against it.

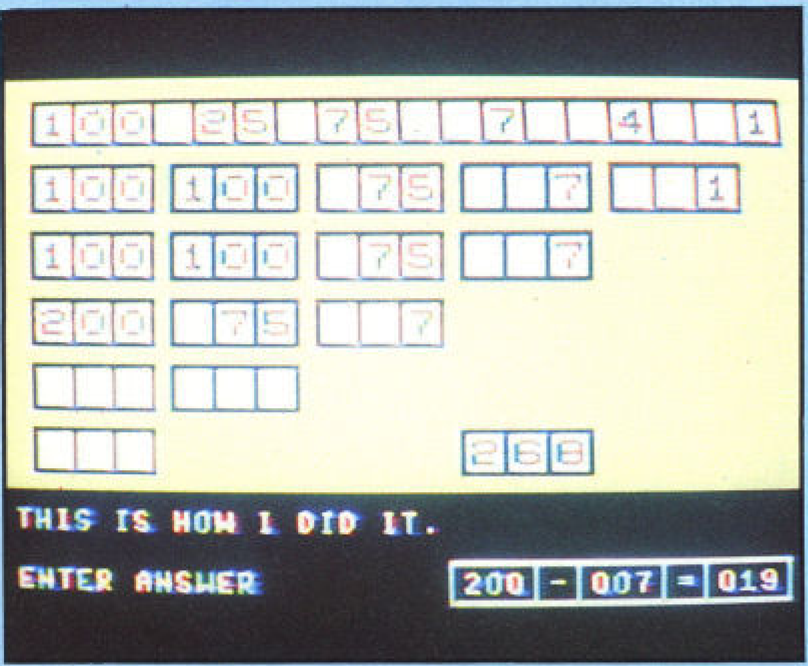
As you pilot your ship over an alien complex you are shot at and rammed by enemy craft and gun emplacements. You must try to eliminate the power supplies and guns of the complex to win a round. This catapults your craft into a space battle bonus screen and then back to another complex which is even more dangerous than the one before.

Otherwise the games are traditional kill or be killed programs with the distinction of high resolution backdrops.

E.D.

COUNTDOWN
Macsen Software C64

Originality 7 Playability 7 Graphics 7 Value For Money 6



THIS GAME BASED ON Channel 4 and Yorkshire Television's Countdown will appeal to anyone who finds anagrams and arithmetic absorbing.

The game is split into three principle parts. The first allows you to select nine letters nominating each selection as a vowel or a consonant. When complete, both players have 30 seconds to extract the longest possible word from the selection of letters and the one who makes the longest word gains a point for each letter.

The second type of game allows one of the players to select a series of numbers. At this point the computer takes over generates a random number. Both players then have another 30 seconds to devise a simple formula which will result in a number as close as possible to the computer's number. The person with the nearest value is awarded the points.

The final type of game is the Countdown Conundrum.

A problem with this game is that all of the characters are left on the screen. This makes cheating a distinct possibility, so play fair.

E.D.

RAGING BEAST
C64 Firebird £1.99

Originality 5 Playability 8 Graphics 8 Value For Money 7



WITH THE CROWD BAYING for blood, you flick the red cape that you're carrying and stand your ground as the bull comes charging towards you. At the last moment, you lift the cape clear allowing the bull to pass underneath. Unfortunately, you misjudge things slightly and Alfonso, the bovine beast, tosses you casually round the arena until your body can take no more punishment and the stretcher bearers have to carry you away to hospital.

That just about sums up the game. You attempt to get the bull to pass underneath your cape as often as possible whilst he tries to gore you to death. If you are successful enough, the crowd throws a ring into the arena which you must endeavour to place on Alfonso's horns. If you are quick enough on your joystick when you are tossed, you can land on the bull's back and ride him rodeo fashion for extra points.

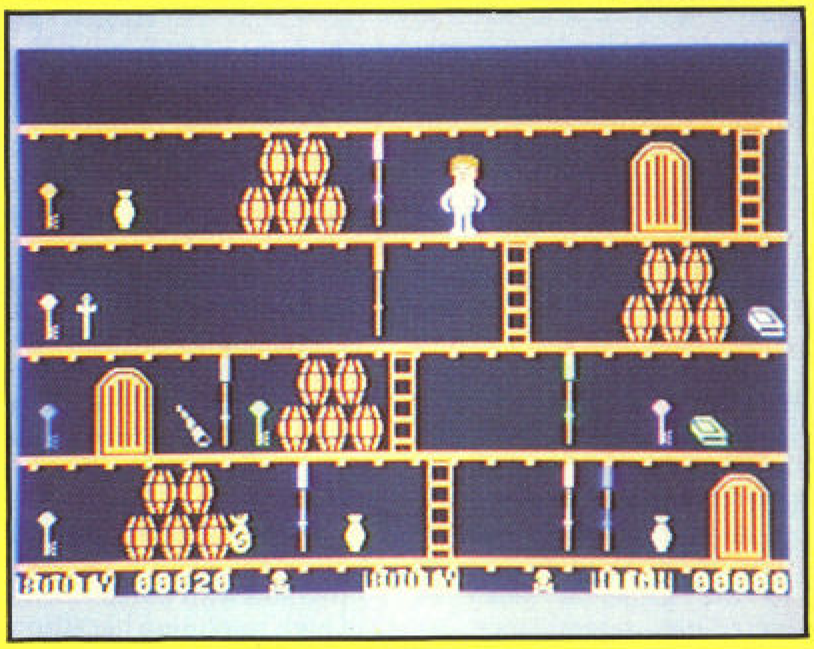
Given that the whole idea of bullfighting is particularly unsavoury and that the game itself has few redeeming qualities, I can find no reason to recommend it, even at the price. There are many better budget games on the market.

G.R.H.

BOOTY

C64 — Firebird — £1.99

Originality 4 | Playability 6 | Graphics 7 | Value For Money 8



SHIVER ME TIMBERS, AVAST behind, pieces of eight and other piratical greetings. The Black Galleon contains huge amounts of ill gotten gains in its 20 holds, and as Jim the cabin boy, it is your duty to liberate as much of it as possible from those evil cut throats. Not that they are likely to give in without putting up a fight but you can cope with that, can't you?

Booty is an extremely addictive ladders and ramps variant. Each of the holds contains assorted treasures and doors to other holds, but before you can access most of them you must first clear a path through the numerous locked doors that stand in your way. These are all colour coded and sure enough, there are keys of various hues lying scattered around although you can only carry one at a time so that a lot of backtracking is required. Most screens start off empty but you soon find yourself chased by ghost pirates and killer parrots!

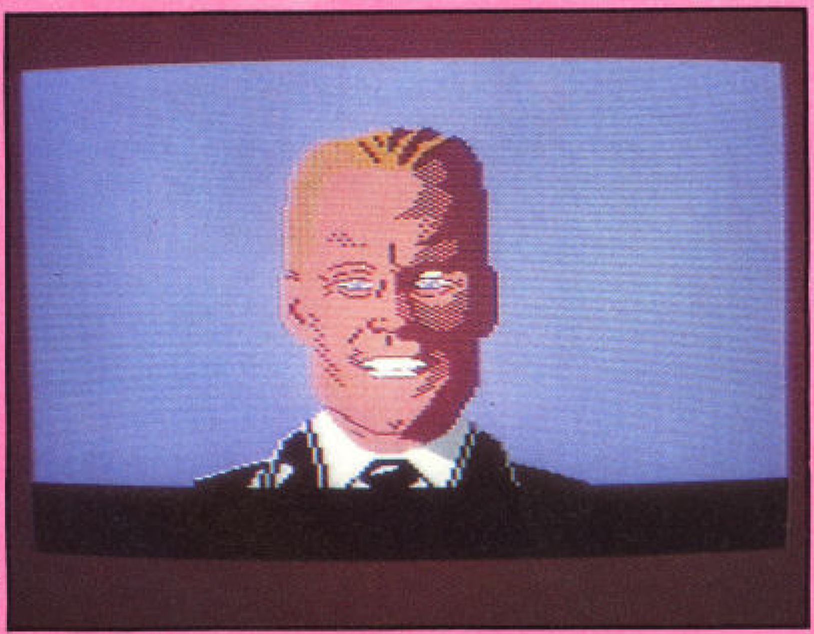
Booty's graphics are simple and clear accompanied by some awful Gilbert and Sullivan but the game's the thing and at £1.99, this one is excellent value for money.

G.H.

MAX HEADROOM

Quicksilva C64 + Joystick

Originality 9 | Playability 8 | Graphics 8 | Value For Money 3



MAX HEADROOM, COMputer generated presenter extraordinaire, started life in a movie bearing his name. The game is a blend of the conceited Max of Channel 4 and the plot of the film.

The story follows the plot of the film very closely but this does not spoil the entertainment value. Max Headroom is to be the presenter of a video show which will include an insidious advertising technique known as the 'blipvert' which has a nasty side effect. Certain people viewing these ads will explode!

Such behaviour cannot be tolerated and Edison has been chosen to recover the Max Module from the massive NET23 skyscraper. Intelligence sources have revealed that the module is hidden in the laboratory behind a complex security system. Some of the security codes have been retrieved from the NET23 computer. These allow Edison to reach all but the top two levels above the 200th floor. The code for the lab situated on Level 210 is in the Presidential Suite on the floor above and the code for the Suite is in the Director's offices somewhere on the floors below.

A door locking mechanism is in operation which must be breached if Edison is to succeed and the floors are patrolled by vicious robots. Quite a challenge.

The lift security requires the operator to keep the single character code lit on an LCD display for a fixed time period. This is done by sending a small voltage along the wires which connect to the correct elements of the display. The capacitance effect decays after a while and the elements must be refreshed regularly or the lift will go out of control and plunge you to one of the lower floors.

Once on the floor of your choice Edison is controlled by icons on each side of the screen. Your first task is to switch off the door locking mechanism by a Simon style game in which you have to play a randomly generated series of four tones back in reverse order.

At the same time the robots will be homing in on you, guns blazing. Edison can withstand a certain number of hits but he may have to rest to recover from his injuries if he is badly weakened. This is where the time element comes into play.

Once he has located the four codes on the floors between Level 200 and 209 by searching each room in turn, he can gain access to the Presidential Suite to find the code for the Lab. He can then locate the Max Module and rendezvous in the basement for the end of his mission.

At this point you are incited to load side two of the tape where an animated Max waits to speak a synthesised message to you. I would have preferred sub-titles to complement the speech synthesis because much of what he says borders on the unintelligible. It is still a convincing piece of programming.

The game looked far more challenging than it turned out to be. I completed it in only an hour or two with two computer hours to spare. Just to test this wasn't beginner's luck I tried again (twice) with similar results. With a few modifications this could be a great game but as it stands does not represent good value for money.

For example, if Edison quickly cracks the door lock code for the first floor he can hide in one of the rooms and cracks all the codes for the other floors. It would have been more challenging if a floor code could only be cracked on the Level in question with the robots bearing down on him. This would necessitate running the gauntlet of robots and finding a breathing space to gain time to unlock the doors.

There are a few random problems like the manhunters Mahler and Breugel who roam the floors, but this presented no real threat and most of the other problems, code changes and something nasty in the lab, failed to appear.

The graphics and music are excellently integrated to give a feeling of excitement and the lift sequence is simple but extremely effective. Pity the game is not more challenging.

E.D.

Originality 8 Playability 8 Graphics 5 Value For Money 7



AMERICAN FOOTBALL seems to be all the rage at the moment. The strategems and showbiz glamour of the sport are gradually being absorbed into our culture. One day its popularity may reach the same degree of fanaticism which accompanies rugby or soccer today.

Ariolasoft has resisted jumping on this bandwagon too soon and consequently this game is far more intelligible to the British market than other computer simulations that I have seen.

Compromises have had to be made to allow the sport to be successfully portrayed. The rows of cheerleaders have been reduced to a single performer and the team consists of just six players per side.

The game options allow a two player tournament, man versus machine or a demo mode. The length of play can be five, 10 or 15 minutes per quarter.

Strategies are selected by joystick while the two sides are down in a huddle. The menu for the defending side consists of a choice of nine formations but offence is more complex.

The attacking side must decide the plays for team formation, two pass patterns and line blocking. If a kick is chosen, a new series of options is revealed allowing three types of kick.

Only one of your players is controlled by the joystick but he may pass the ball to one of two other players depending on the chosen pass pattern. Assuming the player can gain positional advantage without being brought down by an opponent, he can pass the ball to one of his forwards. When the ball is thrown, the receiver becomes the one controlled by the joystick. If the receiver catches (snaps) the ball successfully he must gain as much ground as possible before a tackle is made on him.

While all this is going on the rest of the team should be successfully occupying the other members of the opposition but this only works if the correct blocking counter has been chosen.

As play progresses down the field you must decide whether to kick for goal or go for a touchdown. As in rugby, the scores are higher for a touchdown than for a kick. Successful touchdowns are rewarded with a chance to convert your score with a kick at goal.

The game is complex and contrasts with the rather crude scrolling of the graphics but such is the drawing power of the game you hardly notice this deficiency after the first few minutes.

As an opponent the computer is formidable though not infallible. Although I didn't succeed in defeating the other team I always felt that I'd blown my chance rather than feeling helplessly overrun.

The instructions are thankfully clear and despite the fact that my review copy was accompanied by the original IBM PC game manual I managed to fathom it all out. I hope that the C64 book is a little more informative, a glossary of terms could help.

Plays are often individually devised according to the team's strategist so there is a series of diagrams explaining the mode of action which each play involves. Using these with the gameplay helps you to anticipate where the receiving player will be at any particular time while the play is still on.

Careless players will run back out of range of both of his receivers. This is indicated by a loud buzz when you attempt a pass. The only way out is to run forward and try to dodge the tackles of your opponents. This is not easy.

A kick can be blocked if your strategy is correctly chosen and your players are quick off the mark. The idea being to gain possession of the ball and then hang on to it as long as possible.

Watching your strategy pay off is extremely satisfying and when things go wrong the game becomes totally absorbing. Devotees of the game may cringe at the limitations of the program and those who don't know the game may feel overfaced. Don't let this put you off, this game is great entertainment and you always have your hands full (hopefully with the ball).

E.D.

INTERNATIONAL KARATE

System 3 C64/128 £6.50

Originality 5 Playability 9 Graphics 10 Value For Money 9



WHEN I FIRST RECEIVED A copy of System 3's latest game, International Karate, my immediate reaction was "Oh no, not another martial arts game!".

As a game, International Karate plays in a similar, if obviously superior way to Exploding Fist. In one player option, you must fight against a computer opponent in a series of 30 second bouts. Each time you beat the opponent three times your standard of belt is increased, although I doubt if many people will ever see black belt!

As well as the purely fighting parts, System 3 has included two different sections to test your control of the game. The first of these tests involves smashing bricks with your head, which is fun if a little futile! Secondly, and much more difficult, is a test which involves jumping, ducking and generally avoiding a series of weapons which fly towards you.

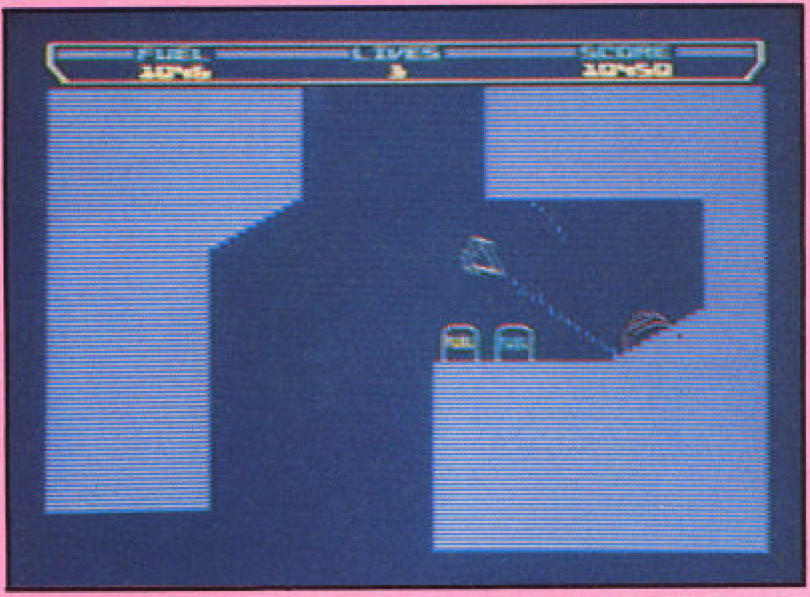
Priced at £6.50, International Karate can only be viewed as excellent value for money, and it is a game that no self respecting arcade fan should miss.

G.D.

THRUST

Mastertronic £1.99 C64

Originality 6 Playability 10 Graphics 6 Value For Money 10



STRICT ORDERS HAVE BEEN given. Your mission: to seek out and recover a valuable batch of pods, scattered around a mysterious and dangerous network of caverns. The pods are protected by missile bases which have to be destroyed.

Once you have a pod, the task is to zoom to the top of the screen and return it to the atmosphere where you will be rewarded with completion points.

In theory, the game appears to be very easy but don't be misled by the first two missions. The first mission merely involves shooting one rather sleepy missile base, picking up the pod and thrusting back to the top of the screen.

On each mission, fuel supplies are randomly scattered and you need to collect as many as possible if you are to succeed. The further you proceed the longer the caverns become and with fuel becoming scarce you need to collect all the supplies that are available in the opening stages. Sometimes the fuel banks are located next to the missile bases and trying to shoot one and not the other can be a real challenge.

The first encounter of real difficulty occurs in the third stage. You must guide your trusty and rather frail looking ship through a large and winding cavern that tends to bend at extremely difficult angles. There are several more missile bases to cope with and less fuel to be found but lifting the pod out of the cavern is, at first, quite a daunting task. It will take you several attempts to master this stage but Thrust's addictive qualities will give you that vital incentive needed to progress.

The missions that follow this are far more difficult and your task becomes more complex. The cavers become huge and to gain access to certain areas a special button must be hit causing the previously locked entrances to slide open. One piece of adv ice here is to not be too hesitant when passing through the newly opened area, as the entrances soon close again and finding yourself being crushed to death is not very pleasant.

Thrust is not as graphically stunning as the arcade original Gravitar but it does feature some nice music and a satisfactory standard of sound effects. The caverns are visually good as are the gem-like pods.

One excellent feature of the game is the superb response of the keyboard, allowing sensitive control of the ship. Manoeuvring in the caverns can be very difficult in certain situations but this can be overcome by mastering the thrust control. Thrust and dexterity are essential once you have attached the pod to the base of your ship. If you travel too fast then the pod will sway causing its weight to drag you into the walls and instant oblivion. Travelling too slow will result in the pod dragging your ship down to the floor of the cavern and, once again, immediate death amidst a ball of flames. If you do manage to guide the pod out of the cavern it is a simple task to zoom upwards to the top of the screen where you will be rewarded with points for the completion of the mission.

There are numerous missions tò complete, another contributing factor to the game's vast appeal. The argument that budget price software reflects the game will certainly be invalid in this case. Although previous budget software has often been of poor quality and of a far too difficult standard, this one should not be missing from any serious games player's collection.

An interesting situation could arise if Mastertronic follows up Thrust with another game of similar appeal. It would increase the grip of budget software on the games market, a circumstance that could put the frighteners on the big guns forcing them to drop the price of their so-called 'better software'.

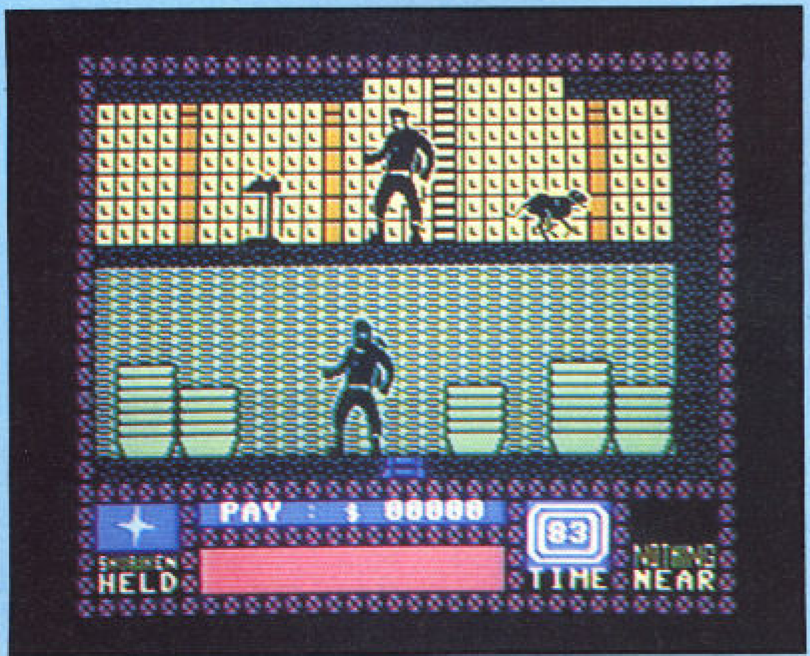
At present I could not think of a better way of spending £1.99, so go out and buy it, I guarantee you won't be disappointed in the slightest.

S.K.

SABOTEUR

C64 Durell

Originality 8 Playability 7 Graphics 7 Value For Money 7



A LIST OF REBEL LEADERS IS contained on a disk, hidden somewhere in the central security building. You are being highly paid to infiltrate a building – seemingly a warehouse – find a disk and make your escape from the roof by helicopter.

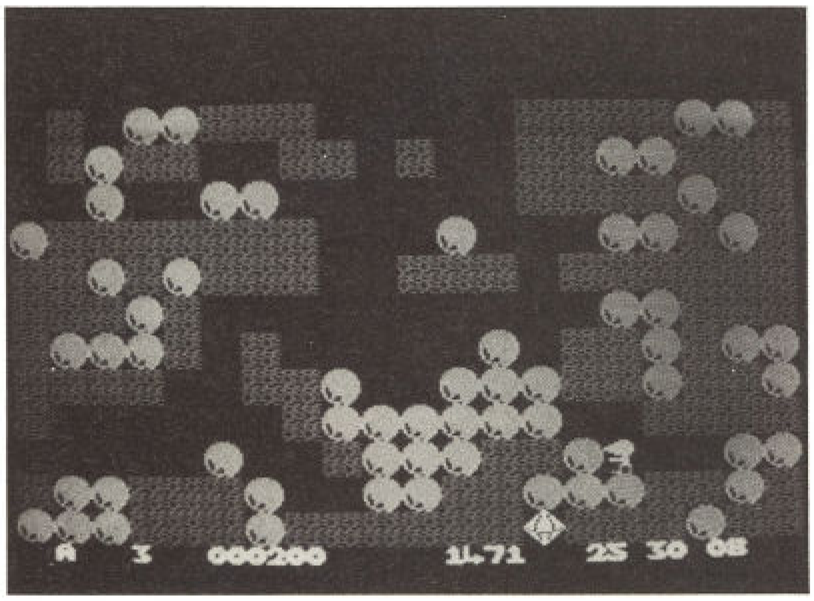
The warehouse is heavily guarded with dogs and guards on patrol and camera guided weapons on the ceilings to be avoided. Your combat skills consist of kicking and punching and you can also throw weapons that you have found – you start off with a shuriken, a pointed throwing star and find knives, rocks, grenades etc. en route. Combat results in a loss of energy, shown as red bar. There are computer terminals to be manipulated for opening doors (although not all will be useful to you) and underground trains to be found as you explore the multi-levelled complex.

The graphics are excellent, especially with regard to the animation of the main characters and the atmosphere created by the raid is very well implemented. Definitely an above average arcade adventure.

G.R.H.

THE RETURN OF ROCKMAN
Mastertronic £1.99 C-16 + Joystick

5 2 2 3



AFTER SEEING ROCKMAN, the Return of Rockman filled me with anticipation of another exciting search through rock filled caverns in the diamond mine. I was disappointed.

The caverns are complex enough but the game is let down badly by the jerky animation which drove my eyes crazy. Rockman is a cute little character who inhabits a very dangerous world. His passion for diamonds is the only thing that keeps him going in a never-ending search.

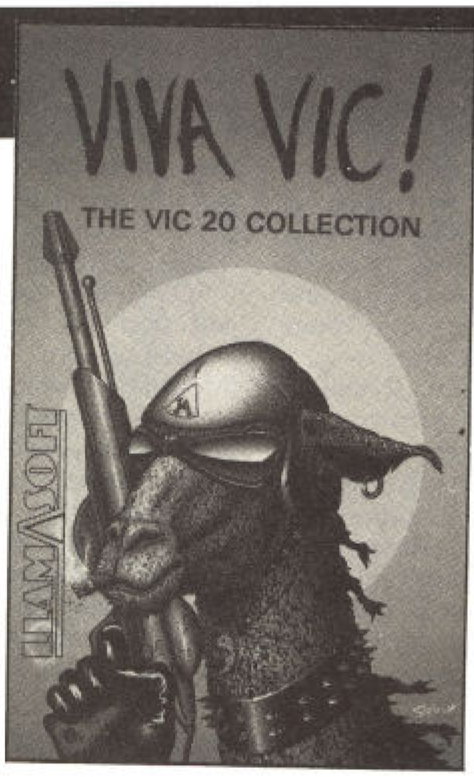
The skill of the game lies in your ability to reach the diamonds without blocking your own path with rocks or falling foul of the fast moving hazards. Speed of action and thought are the skills required. Delay too long and tons of rock will descend on Rockman's pate, killing him outright, move too quickly and falling boulders will block your way to the diamonds.

Why the screen should jerk around so much instead of scrolling gently is a mystery to me. I admit that it adds to the difficulty of the game but it also puts an incredible strain on the eyes.

E.D.

VIVA VIC
Llamasoft Vic-20 + Joystick

9 8 8 8



VIC-20 OWNERS PREPARE yourself for a treat. Rarely do we have good news for you but at least Jeff Minter has not forgotten you.

Ever since he formed Llamasoft in the early days his games have attracted a lot of attention. In many ways the games market owes a lot to Minter's innovative experimentation in the development of the sophisticated games we see today. His taste is in the realms of fast action but his techniques have been applied in many different areas.

Andes Attack was going to be a version of Defender but was changed to avoid possible litigation with Atari. It also hailed the start of Minter's preoccupation with Peru and gave vent to his love of that country's wildlife especially the llamas.

With Traxx he may have painted the town read but certainly this became the predominant colour on the monitor screen. Based on another arcade game, in Traxx you are pursued around a grid by as many as nine Evil Bugs. Your aim is to encircle each square of the grid which then turns red. If you capture the corner squares, the hunters become the hunted as you race around the screen gobbling up the Bugs.

Gridrunner was the game which really showed Minter's mastery of the medium. Twenty waves of very fast action in a mere 3.5K is quite an achievement especially as it only took a week to write!

A Centipede-like creature is threatening your space grid and the humanoids under your protection. Your aim is to blast each centipede out of existence with your plasma gun but a hit causes it to split into two parts, doubling the threat. Two enemy craft patrol the edge of the grid and you also have to avoid their bolts while you battle on.

Laser Zone places you in control of two cannon which run along two rails running at right angles to one another like the X-Y axes of a graph. Aliens attack towards the rails with ever increasing determination and you must co-ordinate the position and direction of your firing to protect each gun. Often this means using one gun to protect the other in a state of absolute panic.

Matrix is an expanded version of Gridrunner and, like some of the other games, needs at least 8K expansion. The action is even faster than the original game and features many more embellishments.

Metagalactic Llamas sold not solely on the strength of the game but equally on its rather eye catching title. It was to be the forerunner of Minter's long dalyance with the ungulate breeds in his forays into the C64 market.

Genetic manipulation has led to the development of MetaLlamas which spit laser beams at the spider hordes of the Evil Empire. If one of these Cyborg archnid mutants manages to land on the planet at the Edge of Time, it changes into a Weeviloid which crawls towards the llama. Only skillful ricocheting of laser spit from the sides of the screen can save the llama now.

Like most Minter games this collection represents almost pure shoot 'em excitement. I always get the feeling that he uses the human race as guinea pigs for his experimentation with gameplay techniques. Playing them is like doing some sort of ability test. This is not surprising because Jeff genuinely loves his games and tends to write for his own enjoyment rather than for pure profit. It's fortunate for him that his love of fast action is in tune with so many game players around the world.

I would not say that Minter appeals to everyone's taste but love him or loathe him you can't ignore him. **E.D.**

NEXUS

Nexus Developments
£9.95 cass £12.95 disk C64 + Joystick

7 Originality 8 Playability 9 Graphics 8 Value For Money

KICKING THE DRUG HABIT is rightly gaining a lot of publicity lately. In this game you get a chance to kick the men behind the pushers. A drugs ring in Columbia, South America, has kidnapped a friend and your newspaper has given you the chance to rescue him. In return you can help to smash the ring by hunting out the answers to 32 burning questions.

The paramilitary members of the ring are holed up in a sprawling HQ complex where room upon room harbours clues to the ring's operations. This stronghold has been breached by a team of secret agents (NEXUS) who will help you to search the building for these clues and to find your friend, Tayo.

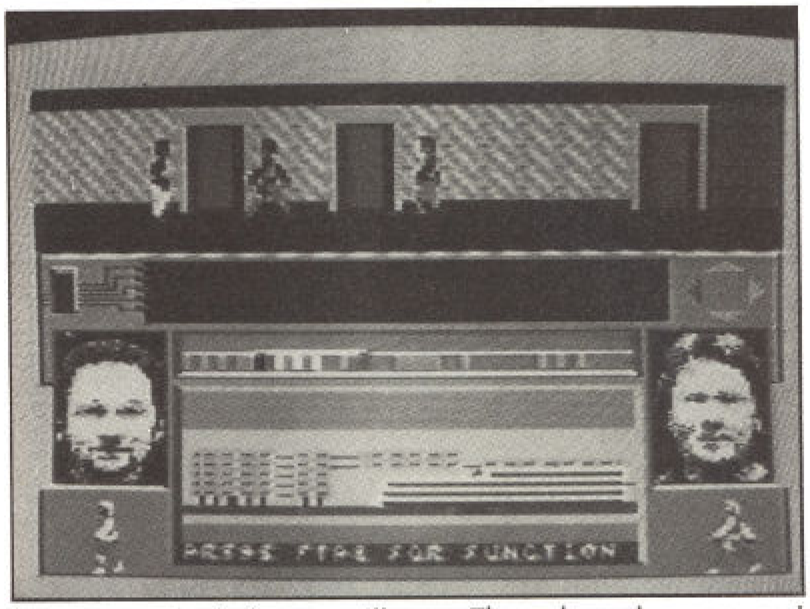
Long passages and complex lift networks connect the various sections of the complex but each floor requires a special colour coded pass card which the NEXUS crew will happily supply. Without the correct card you must rely on your skills in karate and on any weapons you can find to defeat the enemy hordes.

A specific member of Nexus can be contacted via a computer location system. The blue personnel computers may be found in one of the many rooms on the various levels. Held in the databases are details of all the NEXUS personnel. Most are forgery experts but three have special skills. Fiona can tell you where to find hand grenades. Paul is an informer and can point you towards a specific clue and the other specialist can show you where the stun guns are hidden.

To hide their true identities the agents must behave like the ring's guards. If your pass is invalid they will attack you unless you reveal your identity with a special greeting. Even Tayo will attack if you fail to greet him. It's a tough world in the complex.

All commands are issued via the joystick. Attacking moves are made with the fire button pressed and this mode also gives access to the special command menu. From these options your can greet your friends, check your score or arm yourself with grenades or a stun gun. The defensive moves allow you to duck and weave in battle or to move around the corridors.

Most of the screen is reserved for information panels, with an elongated window at the top showing the animated gameplay. When a room is searched the door either changes colour or remains open as an indicator and, while you are hunting for an unsearched room, a



long range 'radar' map will show you any villains lurking further along the corridor.

At either side of the screen are two panels which show the faces of any of the NEXUS team who are currently on the animation screen. The pictures are digitised images of real people, giving a touch of plausibility to the game.

On one of the floors you will find the ring's Transmission Room. All of the information which you have gleaned in your searches can be relayed back to your editor from here. Marks are awarded for decoded answers to the rumours and for any photographs which you may have taken with one of the cameras found around the HQ.

There have been several 'corridor' games produced in the past but few have managed to combine the elements of adventure, strategy and action which this game communicates so successfully. The search for Tayo can be approached on two levels. As a quick hit and run affair the room searches can be largely ignored but your battle skills will be honed to a fine art, or as a full blown assault on the HQ building your abilities to think coolly and logically under pressure will be tested to the full.

Recommended as a worthy addition to anyone's collection.

E.D.

HEKTIC

Mastertronic
£1.99 C-16 + Joystick

3 Originality 5 Playability 5 Graphics 6 Value For Money

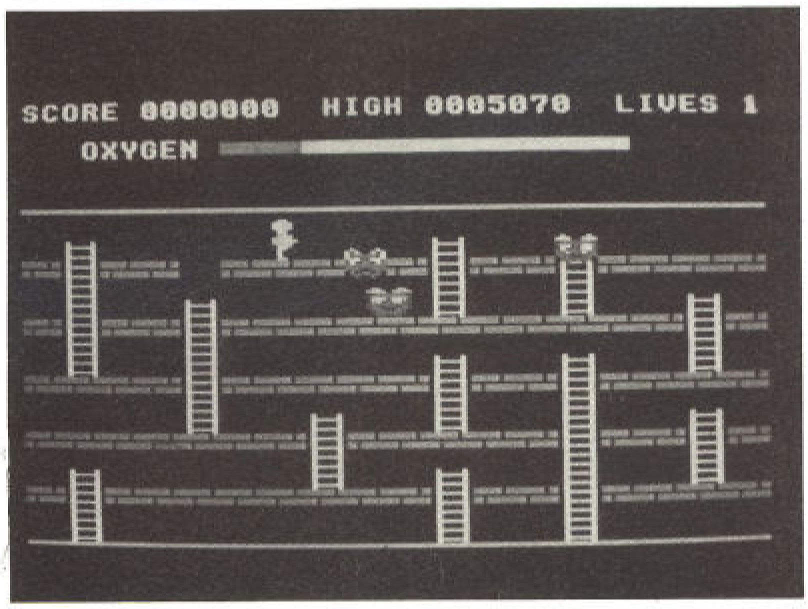
HEKTIK IS ONE OF THE OLDest types of arcade computer games. I first saw a version of it on the Apple many years ago when it was known as Apple Panic. It must be the granddaddy of all platform games.

The screen is split into five levels connected by ladders. Roaming maliciously from floor to floor are monsters out for your blood. The only means of defence is a spade with which you can dig holes to trap the monsters. Here the storyline dips into the realms of a video nasty as you bash your unwary quarry about the ears with the spade until it falls through the hole to certain death.

As you progress the monsters get nastier and you have to dig aligned holes in several levels so that the nasty creature can fall far enough to make his trip a date with death.

The placement of ladders is made on a random basis so no two screens are ever quite the same. There are 16 levels to pass through and judging by my performance I fear that this may prove to be an inexhaustable supply for me.

E.D.



PRINT SHOP

FROM
PRECISION SOFTWARE

Stuart Cooke takes a look at a package that will make your rubber stamp obsolete.

EVERY ONCE IN A WHILE A PROGRAM appears that makes you wonder how on earth you managed without it. *Printshop* is one such program.

In a nut shell the program will turn your C64 and your Commodore compatible printer into a specialised print shop dealing in letter heads, cards and banners. Now you can generate your own stationary, print your own birthday cards and generally impress your friends.

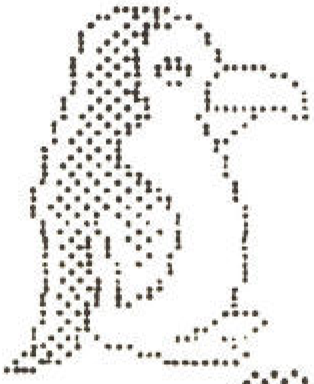
In Use

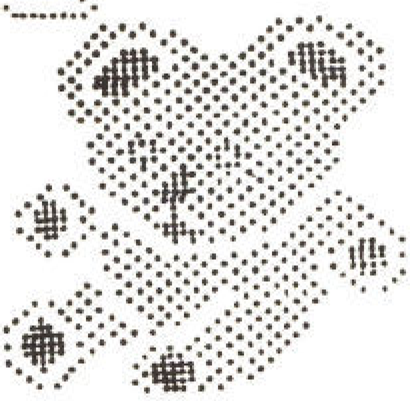
The program is extremely easy to get started, you simply load the program from disk and wait until the menu appears. The following options are available:
GREETING CARD
SIGN
LETTER HEAD
BANNER
SCREEN MAGIC
GRAPHIC EDITOR

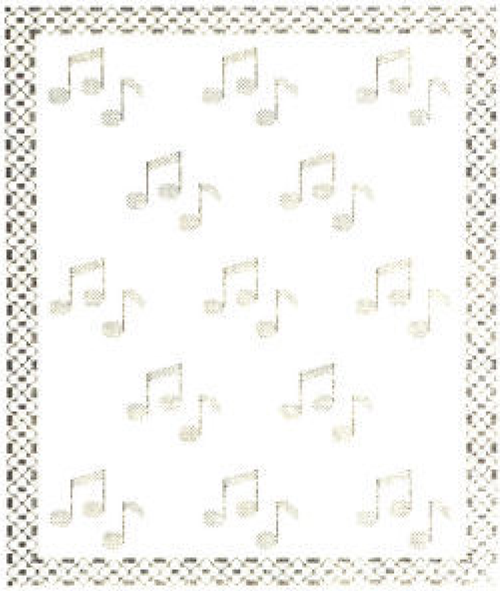
The Greeting Card option lets you chose from either pre-designed cards such as birthday and Christmas greetings or you can design your own. If you choose to design your own you can choose a graphic from the numerous available on the disk. These range from a Christmas tree to a floppy disk.

As you can see, the range is extremely large. If you do get fed up with the graphics available on the disk you can either purchase one of the graphic supplements that are available which give you even more graphics to choose from or you can use the Graphic Designer option from the main menu to design your own. A number of graphics have been included with this article so you can see what sort of detail is possible.









Once you have chosen graphics and the border for the front of the card which can range from hearts to a single line all way around the edge, you can select the font that you want your message to appear in The available fonts are:

When you type in your messages you can choose numerous options such as, where you want the text positioning and whether you want the text to be printed as outline, in 3D or solid. Examples of the fonts have also been included so you can see exactly what they look like.

The greeting card option prints four sides on one piece of paper. Simply fold it and you have a ready made, customised card.

The sign option offers similar facilities to the greeting card option but will allow you to print one large picture. The size and position of the graphic used in both this and the card option can also be changed, this means that the graphic that you use on the sign could be either about one inch square or fill the whole page. Also the smaller the graphic the more that you can print on the page. Sign is a great way of producing cheap posters with a little character.

The letter head option is simply superb. Basically this option allows you to produce paper with a customised header in any of the fonts. The text at the top of the paper can be centred or moved to the left and right of the page. Graphics can also be added and you have the option of just placing graphics in the corners, putting a graphic every other space or having a solid band of graphics. It is also possible to place text and graphics at the bottom of each sheet of paper.

To use the letter head option to its full potential you would have to produce numerous sheets on fan-fold paper and then stick this back into your printer so that you could use it with your wordprocessor. Time consuming but well worth the effort.

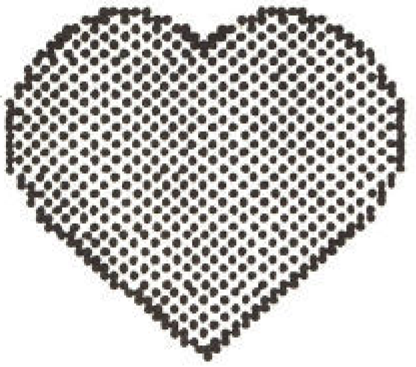
The banner option will print large letters sideways on the paper. This can be used to print messages in any of the fonts. Graphics can be added at either end of the message. This is great for producing large banners for parties etc.

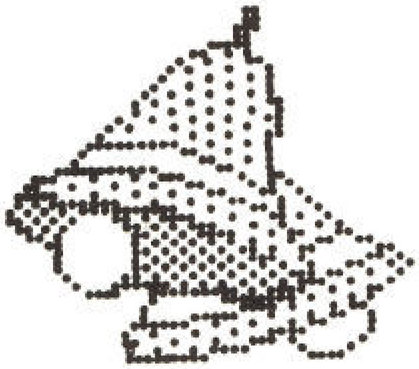
The screen magic option simply draws pretty line patterns on the screen, once a pattern that you like has been displayed you can store it so that it can be printed out. I must admit I don't think that this option is of much use, it simply isn't as much fun as using the graphics included or your own.

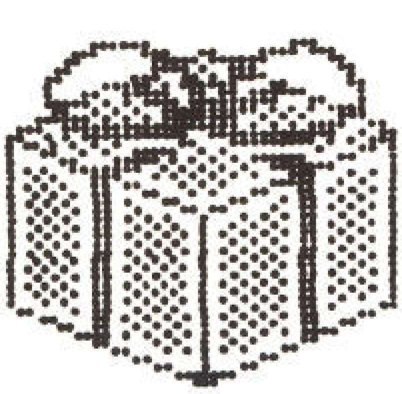
As previously mentioned the Graphic Editor allows you to design your own graphics, print them out and store them on disk for retrieval at a later date. Great fun if you're any good at art and would like to send a specialised message to someone. The graphics editor is easy to use and all available functions are clearly displayed at all time.

Print shop is simply an extremely useful and fun program. Just think, you may never have to buy another birthday card. Mind you, one friend did go a little far when she used Print Shop to send a wedding invitation to her Goldfish!!









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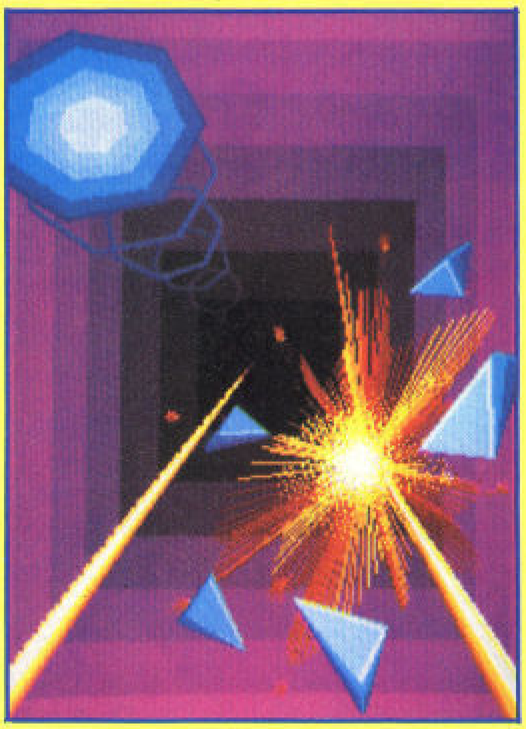
SAVE:SAVE:SAVE:SAVE:SAVE:SAVE:SAVE

Art on the

George Duval doodles his way through some Amiga software.

HOWEVER IMPRESSIVE THE AMIGA'S hardware specification is, it wouldn't be anything without the plethora of high quality programs which have been written for it, to take advantage of the technical wizardry.

Almost of all the software I am going to talk about was programmed in America, but with the Amiga having been recently launched at the Commodore Show, it seems that many British software houses are developing programs of a very high standard.









Commodore

When Commodore launched the Amiga in the US, they had planned to have two pieces of software available; *Graphicraft* and *Textcraft*. *Graphicraft* is an entry level graphics package, as its name would suggest, which although not very special, allowed many people to get the feel of the machine's capabilities – and work out what could be done when a really good package appeared.

Textcraft is a very basic word-processor that, although it provides most of the functions of you would expect (headers, footers, help files, text styles etc.) lacks the finesse to put it up with the excellent packages available for the Amiga's closest business rival, the Macintosh. However, as it is the first, it succeeds in filling a gap that would otherwise make the Amiga an unsellable product.

The final product in the Craft range is *Musicraft*. Although it is not yet finished, I have seen the most up-to-date version and can tell you that it has a great deal of potential.

Musicraft has three main options; the first is a straight score which allows the user to enter or edit a file, as if it were in true musical notation (only you don't need any Tippex!). Option two is to play using the Amiga's keyboard, which is all very well, though a little impractical to say the least! Finally, and in my view most importantly, is the waveform editor. This allows you to load and edit waveforms to produce almost any sound you could want.

Graphically you can draw the waveform you want, or you can choose from a sine wave, a step up, a step down or a variety of others. This section also allows you to edit the envelope and various filters (of which there are quite a few).

If you are a budding musician, *Musicraft* has a great deal of promise, and if (as we all hope) Commodore sees fit to release it with a full MIDI sequencer built in, it could easily be of use to professional musicians.

One product for which everyone has very high hopes is Commodore's *Transformer*. This is the much-heralded piece of software that will allow Amiga users to run existing IBM PC and compatible software. Although I have seen this product, I cannot vouch for its 100% reliability as no one has any dumb 5.25" drives to test it out on. However if this product is finished and released, you can be sure it will have a phenomenal effect on the Amiga's market penetration!

Electronic Arts
COMM/AUG/P/M3/F1

In America, the first company to receive black-box development machines was Electronic Arts, and it was therefore not very surprising that EA released the first piece of software which really showed up the Amiga's capabilities. *Deluxe Paint* (or *Dpaint* as it is more commonly known) is without doubt the most comprehensive and impressive piece of graphical software ever to appear on a personal computer! This may sound like a very over-the-top statement, but it has to be seen to be believed. *Dpaint* provides many levels of use that vary from fun for the Amiga user, who aspires to show what his machine can do, to incredible pictures from artists who decide the Amiga is the tool of their dreams.

Dpaint really does make the most of the Amiga's limitless capabilities. It can operate in any of the three graphics modes, low, medium or high, although

AMIGA



high resolution requires the use of interlacing techniques and is therefore very demanding on memory.

Starting to use *Dpaint* is really simple. Either you can control everything via the mouse or, for the more experienced user, you can use the optional keyboard commands – which certainly speeds up the process of drawing no end.

Having selected the mode in which you wish to draw, you are then presented with a black screen. On the right you have a permanent control panel, and the top screen has a variety of pull-down menus. To start, the best thing is to load in some of the provided files, these vary from a very impressive interpretation of Botticelli's Venus to a technically amazing Starflight scene.

Once you have got to grips with the basics of Dpaint, you can start to use some of the effects that put it so far ahead of any of its competititors. The control panel allows you to pick a variety of drawing shapes and command. You can draw lines, boxes circles, polygons, arcs, and ovals (all of which can be filled if appropriate). You can also choose to add text in any of 12 fonts, as well as being able to draw using various symmetrical options.

It must be said however, that these are only the very basic commands – the complex ones are awesome. Perhaps the most famous feature of Dpaint is its ability to pick up any section of the screen and use it as a brush. In effect this means that you could pick up one of Venus' eyes, enlarge it, spin it round, and then draw with it! This is very effective if you wish to create multiple images, each of which takes up only a small section of the screen.

Another feature of note is the zoom, which allows you to enlarge any section of the screen to a greater size, thus making it much easier to edit or change detailed sections.

For people who wish to give an impression of basic animation, the comprehensive palette adjustment and colour cycling abilities will be vital. By allowing you to alter the palette completely, it is possible to create 32 varying shades of whatever colour you wish, and by then choosing the range of the cycle you can produce some very realistic movement. This is very well illustrated by a file called Waterfall, which comes on the *Dpaint* disk.

Quasi three dimensional filled drawings can be easily created using the wide variety of colours, in unison with the Blend, Smear and Shade commands. They allow you to use the airbrush technique to the full, and can lead to some very impressive results.

Because *Dpaint* uses the standard IFF format for graphics files, any pictures created on one of the other popular graphic packages can be loaded into *Dpaint* and then edited.

Printers are all catered for through the Workbench interface, but I must mention the Okimate 20 printer which, when used creatively with *Dpaint*, can produce some of the most outstanding colour dumps I have ever seen.

Overall *Dpaint* is a spectacularly good piece of software. Its only real fault is that it is sometimes a little slow, mainly due to the fact it was programmed in C. Otherwise it must be said that if you own an Amiga, you must have *Dpaint*!

The biggest problem with releasing one piece of software as good as *Dpaint* is that everything else must be as good, if not a little bit better. Electronic Arts' next release, another in the productivity series, is *Deluxe Print*.

Using files either created on *Dpaint*, or built into the art disks of Dprint, this package is a comprehensive printing utility that allows the user to create letters, cards, signs, stickers, invitations, and a whole variety of other things amazingly simply.

Not only can you load other IFF files, you can overlay text in any of the fonts provided, and even use the banner command to enter text strings longer than 81 characters. To make the most of *Dprint* you really need one of the wide variety of colour printers catered for in Preferences, the results just don't look the same in 16 shades of grey!

In theory, *Dprint* could be used to

produce small booklets or, using some special functions, colour separations. Products like Dprint show how close we are to complete magazine production on a disk.

If these two programs were not enough to establish Electronic Arts as THE software house for the Amiga, the finishing touches are being added to a product which should outshine everything before. Named *The Deluxe Video Construction Set* (phew!!), it will do for animation what *Dpaint* has done for static graphics.

Deluxe Video was written to let Amiga Users create animated shows that could either be for fun or, in a business environment, practical. Professional video companies will find the scope for *Deluxe Video* endless, and in many ways it should assure the Amiga of a certain markets.

As well as creating animated drawings, *Video* allows you the unprecedented feature of being able to add a complicated soundtrack – anything from explosions to Vangelis. Using a graphics storyboard, and a variety of timing marks *Dvideo* can create sequences that many competent 68000 programmers would be very jealous of.

I have already seen one very impressive sequence created using *Dvideo*, showing the various stages of the Shuttle, from a close up at take-off, to a sequence of it orbiting the world – and it certainly lived up to my expectations.

Without doubt Electronic Arts is very confident of the Amiga's success, and if EA keeps on producing software of this quality, it really can't fail!

Aegis

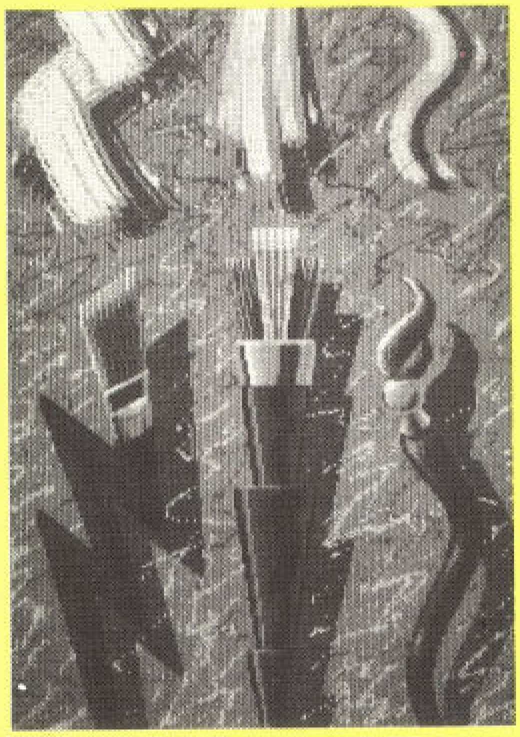
If there is one company that has managed to rival the quality of Electronic Arts when it comes to graphics packages, it must be Aegis. Not only has this company produced an animation package before EA has managed to release *Deluxe Video*, but it also has an excellent graphics package.

Images is Aegis' attempt at a graphics package to make the most of the Amiga. As with *Dpaint* it uses IFF format, allowing pictures to be imported from and exported to other packages. Although *Images* is an outstanding product, it unfortunately isn't as good as *Dpaint*. Deep down, it lacks the facilities that enable such easy creation of complex pictures.

Perhaps the most notable absence, when compared to *Dpaint*, is the inability to create brushes of anything but a limited width. Aegis does have one major thing in its favour – Jim Sachs. He is the resident artist for Aegis, and is without doubt the best artist on the Amiga. His Porsche files (especially the new Turbo) are, astonishing.

Aegis' second release for the Amiga is *Animator*, a complex and very good animation package that uses storyboard techniques – in a similar way to *Dvideo* – to create excellent sequences. Written by the now defunct Island Graphics team, it allows the user to create

Art on the AMIGA



anything from basic polygon to polygon twixing, to much more complex filled graphics animations.

Although *Animator* runs in low resolution mode (320 × 200), commands such as tween, hook, rotate and hue allow you to mix shapes and colours to create some very effective 'TVesque' graphics, and I'm sure that given enough time someone cold produce a very good version of the Channel 4 spinning logo!

Space seems to be the order of the day as far as animation packages are concerned as the one storyboard provided with *Animator* consists of an Apollo lookalike landing on the moon. Using the background ability, a very effective three dimensional feel has been created.

My personal favourite product from Aegis is *Draw*. Designed primarily as a serious CAD/architectural program it allows you a variety of features you would not normally associate with graphics packages and which, especially on the Amiga, can be used very effectively.

A massive variety of straight lines, three dimensional boxes and polygons are all available at the click of a mouse! Perhaps the most dramatic facility of *Draw* is Zoom. This allows you to move in amazingly close to edit any previously created pictures. *Draw* is another product, like *Dpaint*, that could quite easily justify the purchase of an Amiga, if you had the right application for it.

Overall, Aegis are a very good software house. Until now a little overshadowed by EA, but by getting *Animator* out before *Dvideo*, and by releasing the excellent *Draw*, Aegis has proved that it's really a force to be reckoned with.

Various

As well as the big companies who are producing more than one program for the Amiga, there are plenty of companies producing one or two products. One of these companies produces a product called *Gizmoz*. As its name suggests, this is a collection of little utilities that add up to a very impressive package indeed. As well as the now obligatory calculator, there is an excellent communications package, and plenty of other bits and bobs.

Whilst on the subject of comms, I though I'd mention an excellent terminal program I received called *Online*!. Not only does it allow the Amiga to emulate various other computers, but it allows split screens, stored files, auto dialling, preset calling (which means you can set it to call up a certain system at a certain time and grab any messages before logging off!), and all for $70 in the US.

Not to be left out, England has at least one product to be proud of. Although not finished yet, Y2's *Prestel* software is particularly impressive – especially when you consider that the Amiga has been on sale in America for more than six months!

Conclusion

It is a great relief to me to see the quality and quantity of software that is coming through, both from America and more recently the UK. Products such as *Deluxe Paint* are of such a high quality that they almost assure the Amiga's success, whatever its critics have said.

WORDPROCESSING on the PLUS/4

Arnie Blomberg provides some handy tips for Plus/4 Cassette users.

IT HAS ALWAYS STRUCK ME as being extremely silly that Commodore packaged the Plus/4 computer with a cassette recorder. The reason that it seems odd is because in-built software has no way of SAVEing to this device. Don't despair, I have found a way in which you can use the in-built wordprocessor with the cassette recorder. Now you don't have to go to the expense of buying a disk drive.

As well as giving information about how to use the Plus/4 with cassette, I have also modified the *Full Speed Ahead* fast tape routine so that it sits in a better place in the Plus/4's memory so that you can write longer programs as well as use it with the wordprocessor. Now you can SAVE and LOAD documents just as fast as your friends with disk drives.

Saving Documents on Tape

Type the document as usual, you can print it either before or after saving on tape. However, you will need to make a note of the last line of your document in the word processor. Read 'L=' on the display on the bottom of the screen.

When the document is completed enter the Machine Code Monitor by following the procedure below VERY CAREFULLY.

1. Press the RESET button (small button next to the on/off switch) and hold it depressed.
2. Press and HOLD down the RUN/STOP key (next to SHIFT LOCK).
3. Now release first the RESET button, and after the screen has changed, the RUN/STOP key. (If the RUN/STOP is pressed first it prints the letter 'c' in the document).

The document is stored in RAM memory starting from location Hex $C000 finishing according to its length. It is possible to view it in the Monitor's ASCII dump display, (type 'MC000' [RTN]) but only upper case letters and numerals will be shown. For the Monitor to access RAM above $8000, you have to change the value in Location $07F8 to $80. See the Plus/4 manual page 183 for a full explanation.

Now type the following to save the data:

S"FILENAME",1,C000,XXXX [RTN]

XXXX being the end address found in the table below according to the last line of text in the document.

The cassette recorder prompts will show as normal.

To load a previously saved document enter the word processor first and go to the Machine Code Monitor as described above, but clear any document from memory first, by keying CBM 'c', then 'cm' [RTN].

If you don't clear, the documents will merge - which could prove a useful facility, load a short document into the top of the processor to merge with one already in the lower part.

The load command is 'l' [RTN]. You can specify "FILENAME" after the 'L', as on tape it will otherwise load the first program that it comes to. I hope, however, that you will keep a clear record of the cassette recorder revolutions for each document as, unlike the disk drive, it cannot go straight to a file. If you do not know where it is, you may have a long wait before the letter which you want to load is found.

When the tape has stopped key, 'X' [RTN] [RTN]: The Plus/4 has taken us to the spreadsheet. Key CBM 'c' and then 'tw' [RTN]. You will now be in the wordprocessor with your document displayed. Use the same procedure to return to the wordprocessor after saving on tape.

Another merge possibility is to save the document not from the beginning, but from a later line number. In this case substitute 'C000' with the corresponding Hex number for that line in the table. Doing it this way, we lose the Set Pointers for that section, as these are stored in the first part of the RAM at $C000 before the actual text. It is best to set these again at the end of each paragraph after merging, in order to be able to use the edit facility.

I have encountered a strange phenomenon when printing a document after loading it from tape. The same may also happen when loading from disk.

If you print straight after loading, it will only print up to the line actually displayed on the screen, and will only print the whole document if you have run the cursor down the document to the bottom line at some stage. You may also find peculiar things occurring if you try to edit, insert, or delete lines without going down to the last line first. And the shifted ClearHome will not take you right down until you have viewed the end of the document.

Using Fast Tape Save

Published in the February 1986 edition of *Your Commodore* magazine was an

WORDPROCESSING

article and program by Nick Hampshire called Break the Speed Limit, a Fast Tape Saver/Loader, which I have used for all my programs since. I have found that it also works excellently with the word processor, if the routine is stored at Hex $7000. The program as published stores the Machine Code Routine at $3D00, top of RAM for the C16. In order to store it at $7000 or any other location, some of the lines have to be amended as shown in the listing.

Using the Fastsave with the wordprocessor you have to stop the Plus/4 from jumping into Basic after loading or saving, as you cannot get back to the word-processor by the 'SYS1525' command on key 'F1' without clearing the document from memory. This is prevented in line 1165, forcing a BREAK to the Monitor. To activate the Fast Save when in the Monitor, the command is 'G7000' [RTN]. In the save command, substitute ',7' for the ',1' after the second ''. Now tapes will work about 10 times faster.

As the document can be up to eight kilobytes in length, normal tape operation will take almost five minutes to load or save, whereas Fastsave will do it in about only 45 seconds. Incidentally, roughly 25 seconds of this time is taken up by leader, header and gap, and eight kilobytes of data is actually written and read in only 20 seconds. I urge you to use the Fastsave routine – you will definitely not need a disk drive then.

You can load the previously saved Fastsave routine from the Monitor either before entering the word-processor or after, by the command 'L' [RTN]. If you do the former, you can also load it from Basic with 'LOAD" " ,1,1'. When ready to Fastsave you must have commanded 'G7000' and then use device code '7' before the addresses.

If you want to use the fast tape routine with other programs, I find it best to store it at $7D00, which is the highest RAM that Machine Code can easily access. To protect this from being overwritten it is necessary to lower the top of memory by 'POKE 56, DEC("7D"):CLR'. This leaves 27900 bytes for your Basic program and variables.

If this is too little, I suggest you store the routine at $1000, which is the beginning of RAM for Basic, so the vectors for start of Basic will have to be raised before you load and run the Fast Tape Loader, and any programs that have been fast saved previously. Do this by 'X=DEC("13"): POKE44,X: POKE*256,0:NEW'.

This will not work if you are going to use the hi-res modes.

Then store the routine at $4000, and raise the start of Basic to 'X=DEC("43")'. But you have to command 'GRAPHIC 2,1' [RTN] at least once before loading or moving the start of Basic. If you use hi-res modes with the Fastsave routine at $7D00, the start of Basic will not have to be moved, but you should also use the GRAPHIC2,1 command first before loading. Don't use GRAPHIC CLR at all. Whenever I have tried to, it just seems to move Basic higher up rather than lower. Although GRAPHIC 0 on its own is alright.

I find that its best to load the Fastsave routine before any Basic programs, and then type 'NEW' [RTN]. But you do not need the routine to load a Fastsaved program, this is only necessary if you intend to do more saving.

PROGRAM: FAST SAVE AMENDMENTS

```
800 REM * ADDITIONAL LINES TO FAST
SAVE IN YOUR COMMODORE FEB 1986 PA
GE 28
810 REM * TO LOCATE THE ROUTINE AT
 AN LOCATION FROM $1000 TO $7D00
820 REMOVE* LINE 1165 UNLESS SAVIN
G FAST SAVE ROUTINE FOR WORDPROCES
SOR
900 INPUT"LOCATION":HX$:HX=DEC(HX$
):HL=INT(HX/256):IFHL<>HX/256 THEN
 GOTO 900
1100 POKE56.HL:CLR:HL=PEEK(56):HX=
HL*256
1110 I=HX:T=0:DI=HL-61
1125 T=T+A:IFA>60AND A<64THEN CB=I
-HX:IFCB<350AND CB<>263AND CB<>276
THEN A=A+DI
1130 POKEI.A
1165 POKEHX+436.0:POKEHX+197.0:POK
EHX+10.0:REM THIS LINE ONLY FOR WO
RDPROCESSOR
1202 PRINT"(DOWN)  'SYS"HX"'  TO A
CTIVATE FASTSAVE "
1205 PRINT"(DOWN) TO SAVE AS MACHI
NE CODE ROUTINE GOTO"
1207 PRINT"(DOWN) MACHINE CODE MON
ITOR AND COMMAND"
1209 PRINT"(DOWN) S"CHR$(34)"FASTS
AVE"CHR$(34)",7,"HEX$(HX)","HEX$(H
X+635)
1210 REM  SYS HX:END
```

Wordprocessing Tips

If you want to write quotation marks ", you will find that pressing shifted '2' will give an apostrophe. To get a proper quote you have to use its ASCII value 34 in reverse video (Control key/RVs On), the manual calls it "Embedding ASCII Characters". You then type 'asc34;'. I have found some problems in using this, in that sometimes the character appears in the wrong position, perhaps in the middle of an adjacent word.

I think this has something to do with the justification of the document, as it doesn't seem to happen when not justified, so it may be easier to give the command no justify preceding the paragraph with the quotes.

Another method which allows you to keep the justification is to ignore the incorrect position of the printed ASCII character, until you have finally edited and corrected the printed document.

You now have to force the line in which the ASCII character appears to become the end of a paragraph. Place the cursor on the word that, on the paper, starts the next line after the ASCII character. Now insert spaces (shifted Inst/-Del key) so that this part of the text moves until it is at the beginning of the next line on the screen. Then move the cursor back to where it was when you started inserting and press return. Although a new paragraph has been created, it will still be printed as continuous text. Occasion-

on the PLUS/4

ally, you have to do the same with the beginning of the line with the ASCII character to get it laid out correctly.

It can be a bit tedious, but worth it if you want to have a good looking document. Don't forget to set the pointers at the end of each paragraph as, if you try to edit without, you will tear your hair out with frustration.

As well as the 'enhance on/off' (double width letters) 'asc14/15;', as mentioned in the manua, other ASCII codes that can be embedded are:

reverse on	=asc18;
linefeed	=asc10;
graphic mode	=asc145;
reverse off	=asc146;
carriage return	=asc13;
nongraphic mode	=asc17;

The graphic mode 'asc145;' will enable the graphic characters that can be generated by shifted alphabet keys (not with CBM key) to be printed, but you will not see them displayed on the screen as such. You have to check the symbols on the keyboard carefully and type more or less blind.

It appears you may also have to repeat the 'asc145;' command for each new line on the paper just another Plus/4 peculiarity. The 'asc17;' will return to the normal non-graphic mode.

It is also possible to print the other graphic characters by stringing their ASCII codes together, from page 194 to 196 in the User Manual. It appears that the maximum possible number is five, and the 'graphic mode' will have had to be set first. When using two or more ASCII codes together in reverse video, separate each number from the previous one by a semi-colon. You do not need to repeat the 'asc' command.

Underlining can be made by the '-' (broken) or shifted '*' (continuous), but only when the underlining itself occupies its own line on the paper. And again you may have found out by trial and error.

I have noticed that a created block will stay in memory even after you have cleared memory (cleared the screen), and can be inserted on the blank screen, which is useful if you want to retain only one paragraph of a document.

You can use the line feed to keep records of mailing lists of names and addresses more easily as a wordprocessor document (saved on tape!). After each segment of the address type 'asc10;' in reverse video, and continue typing the remainder of the address on the same line without pressing Return until the end of each address. Each section of the address will be printed on paper on a new line, although on the screen it appears as a continuous line. Up to 99 addresses can be stored on one document. Before pressing Return you can add 'asc10;10;' for two extra blank lines before the next address.

Please remember that every time 'asc', followed by a number has been mentioned, it must be typed in reverse video on the screen (Control£ Rvs On). It should also be mentioned that all theses tips may only work on Commodore type Dot Matrix printers.

I hope that some of these hints and procedures will enable many more Plus/4 owners to utilise the built-in software, which after all is quite good for the average home user. If you have neither a disk drive nor a printer, but are contemplating one or the other, take my advice – get the printer. It will widen your scope of usage much more than the disk drive.

End Addresses for Tape Saving

LINE 1 = C12C	LINE 2 = C179	LINE 3 = C1C6	LINE 4 = C213
LINE 5 = C260	LINE 6 = C2AD	LINE 7 = C2FA	LINE 8 = C347
LINE 9 = C394	LINE 10 = C3E1	LINE 11 = C42E	LINE 12 = C47B
LINE 13 = C4C8	LINE 14 = C515	LINE 15 = C562	LINE 16 = C5AF
LINE 17 = C5FC	LINE 18 = C649	LINE 19 = C696	LINE 20 = C6E3
LINE 21 = C730	LINE 22 = C770	LINE 23 = C7CA	LINE 24 = C817
LINE 25 = C864	LINE 26 = C881	LINE 27 = C8FE	LINE 28 = C94B
LINE 29 = C998	LINE 30 = C9E5	LINE 31 = CA32	LINE 32 = CA7F
LINE 33 = CACC	LINE 34 = CB19	LINE 35 = CB66	LINE 36 = CBB3
LINE 37 = CC00	LINE 38 = CC4D	LINE 39 = CC9A	LINE 40 = CCE7
LINE 41 = CD34	LINE 42 = CD81	LINE 43 = CDCE	LINE 44 = CE1B
LINE 45 = CE68	LINE 46 = CEB5	LINE 47 = CF02	LINE 48 = CF4F
LINE 49 = CF9C	LINE 50 = CFE9	LINE 51 = D036	LINE 52 = D083
LINE 53 = D0D0	LINE 54 = D110		
xxx			
LINE 53 = D0D0	LINE 54 = D11D	LINE 55 = D16A	LINE 56 = D1B7
LINE 57 = D204	LINE 58 = D251	LINE 50 = D29E	LINE 60 = D2EB
LINE 61 = D338	LINE 62 = D385	LINE 63 = D3D2	LINE 64 = D41F
LINE 65 = D46C	LINE 66 = D489	LINE 67 = D506	LINE 68 = D553
LINE 69 = D4A0	LINE 70 = D5ED	LINE 71 = D63A	LINE 72 = D687
LINE 73 = D6D4	LINE 74 = D721	LINE 75 = D76E	LINE 76 = D7BB
LINE 77 = D808	LINE 78 = D855	LINE 79 = D8A2	LINE 80 = D8EF
LINE 81 = D93C	LINE 82 = D989	LINE 83 = D9D6	LINE 84 = DA23
LINE 85 = DA70	LINE 86 = DABD	LINE 87 = DB0A	LINE 88 = DB57
LINE 89 = DBA4	LINE 90 = DBF1	LINE 91 = DC3E	LINE 92 = DC8B
LINE £3 = DCD8	LINE 94 = DD25	LINE 95 = DD72	LINE 96 = DDBF
LINE 97 = DE0C	LINE 98 = DE59	LINE 99 = DEA6	

Notes for Table

After going to the monitor (press re-set button, press Run/stop) and release re-set), type:

S"FILENAME",1,C000,XXXX [RTN]

Type XXX (end address) from the table, where the line number is the one after the last line in the completed document in the word processor.

To load a document from tape, enter monitor from wordprocessor as above and type:

'L' [RTN]

To return to the word processor after saving or loading, key 'X' [RTN] – then CBM 'C' and 'TW' [RTN].].

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PLEASE COMPLETE IN BLOCK CAPITALS

Surname: ....

Firstnames: ....

Address: ....

....

Postcode: .... **Telephone Number:** ....

Times to contact you: ....

Program Name: ....

Computer/memory size: ....

Extras required (disk etc): ....

Have you sent the program to another magazine? Yes/No

Office Use Only

Date received: .... **Date ack. sent:** ....

Date checked: .... **Checked by:** ....

Rating: ....

Comments: ....

....

Reply sent: .... **Ack. received:** ....

Date printed: .... **Date returned:** ....

Fee: ....

Date Fee sent: ....

3 into 1 E

Tony Crowther presents the only graphics designer that you ever likely to need.

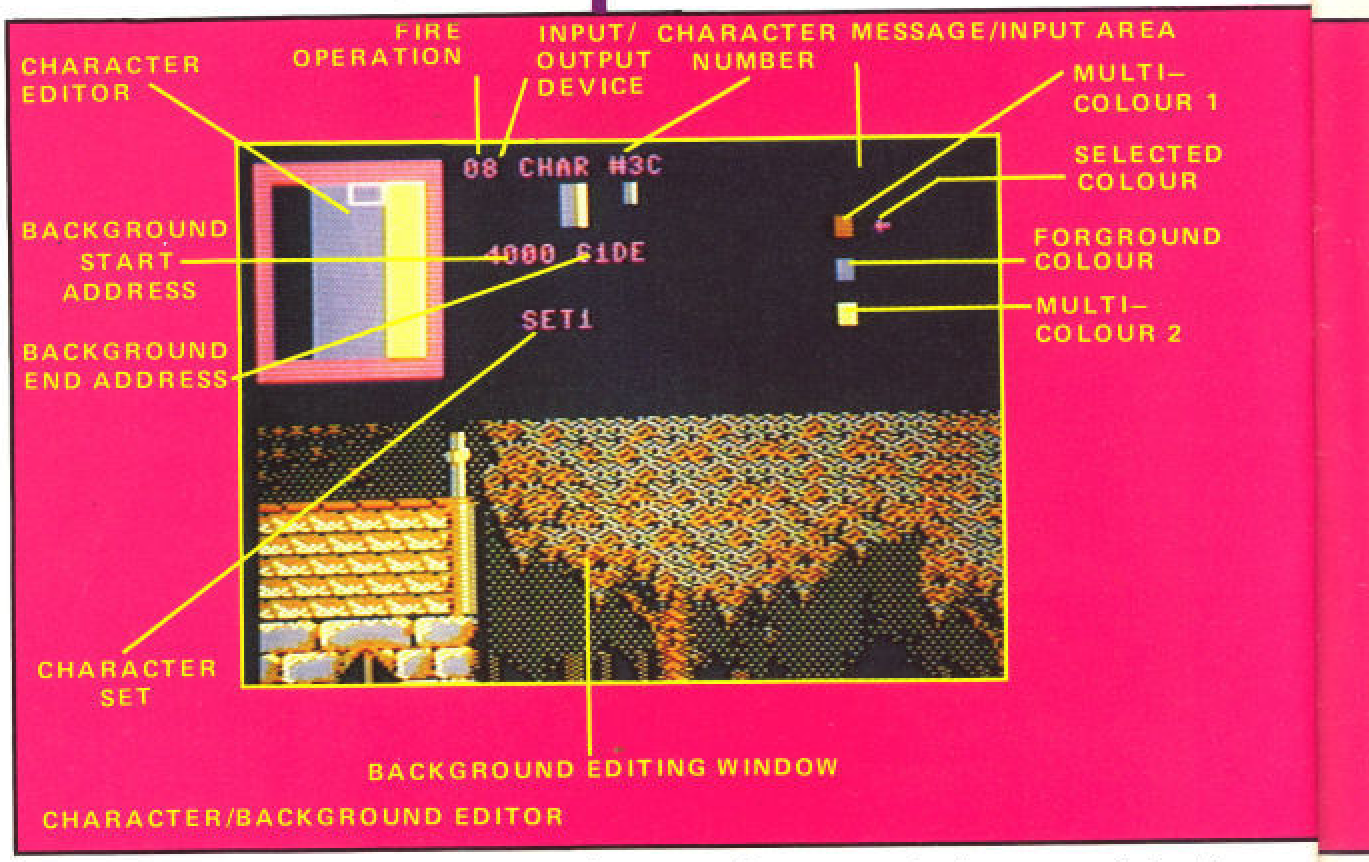
THE VAST MAJORITY OF computer programmers probably a diverse range of graphics aids. These may include screen editors, character editors or sprite editors. The only problem is that none of them can carry out all the functions that the programmer requires. Obviously, the only way around this is to use a number of programs to produce one finished product.

For example, if I was writing a game I would use a character editor to produce user defined characters. I would then use these to produce the actual background for the game. Then I would load in a sprite editor and produce the sprites. Wouldn't it be easier if it could all be done with one program which encompassed all the functions I could ever need? Hence the birth of the *3 IN 1 EDITOR*.

3 IN 1 consists of a sprite editor that has provision for multicolour and hi-res sprites. Sprites can be animated, copied, positioned on top of each other etc. Wtihin the program there is also a combined character and background editor. What makes this part of the program so special is that you are not limited to designing just single screens but it is possible to define screens that take up to 32K of the computers memory.

The editing screen acts as a small window that can be moved over a much larger area. Screens such as the ones I created in games like Monty on the Run and Son of Blagger are extremely easy to produce. Until now most scrolling screens were designed as individual pictures and 'stuck' one next to the other at a later date.

The *3 IN 1 Editor* has already aroused much interest in programming circles and many programmers will be using it to help them design games that will be appearing over the next few



CHARACTER/BACKGROUND EDITOR

months. The complete editor program is published here so that it is available to anyone who is interested in graphics. This month I will detail the commands available within the editor so that you will be able to use it. In next month's issue of the magazine I will be presenting a few example backgrounds so that you can see exactly what is possible with the editor.

Getting it All In

3 IN 1 Editor is presented in the form of a series of Basic loaders. This makes it extremely easy to enter and check for typing errors. Simply type in all of the loader programs and save them on to disk or tape. If you are using tape then do make sure that you change the ',8' to ',1' in the LOAD instructions where indicated.

Once you have entered all of the programs and saved them individually then you can create the actual machine code file that you will use. To do this LOAD the program '3IN1 LOADER1' and type RUN. This will POKE the machine code into the necessary areas of memory. Once the program has finished running it will automatically load the next part of the program from TAPE or DISK. You did change the numbers if using tape didn't you? Once the last part of the program has been RUN press the space bar to enter the program. *3IN1 EDITOR* is now ready for use.

Use option 8 to SAVE *3IN1 EDITOR*.

To use the editor in future you type:

LOAD "3IN1 EDITOR',8,1 for disk

or

LOAD '3IN1 EDITOR',1,1 for tape.

In order to start the program you then type:

SYS 50300

If, while entering the program, you made any typing errors these will be found by the individual LOADER programs when they are RUN. If you do find any errors then you will either be presented with the line number where the error is located or an 'illegal quantity error'. The way to deal with each of these errors is detailed below.

Error in Line Number

If you get this error message then simply list the program so that you can find out in which LOADER program the error occurred. Then correct the line by comparing yours with the listing for that LOADER and then re-save the program. Do make sure that if using tape you don't resave the program over another part and that you save it in the correct position so that it can be loaded in order.

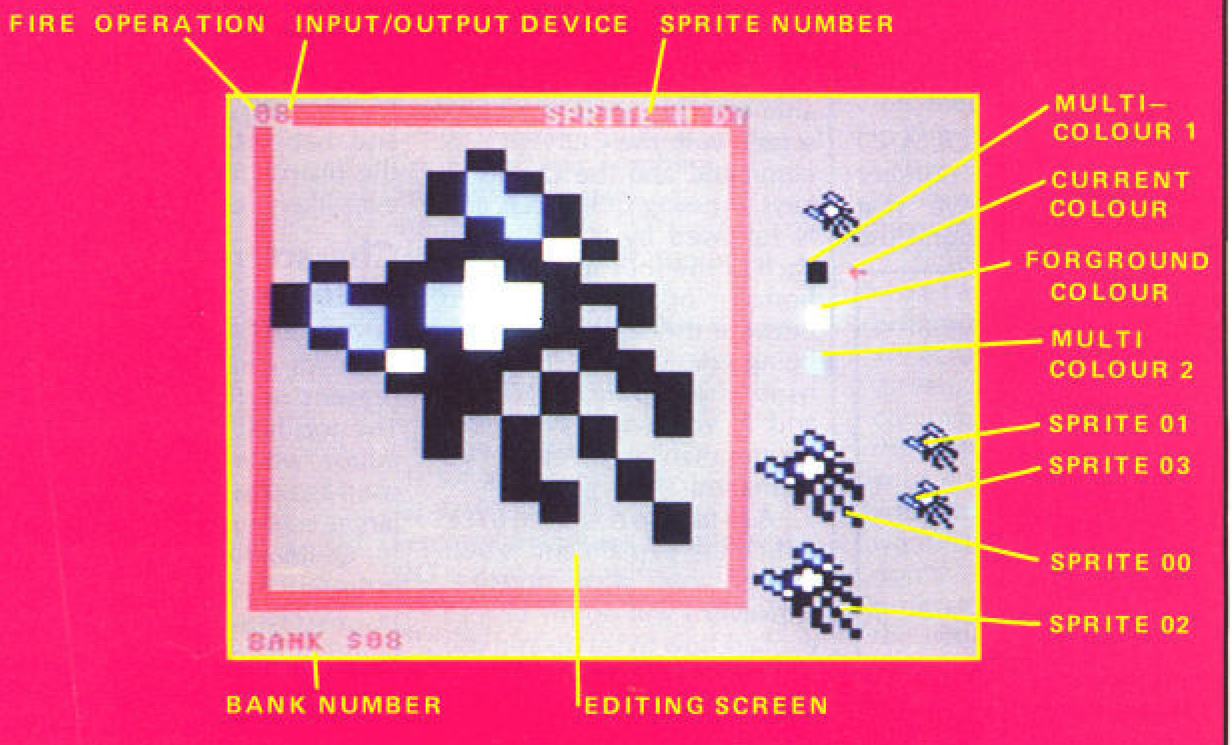
Illegal Quantity Error

If you get this error then you have either typed in a number greater than 255 or simply missed a number out. If you do get an error then type this line and press RETURN:

PRINT 2040+(10*L)

The number that is printed denotes the line where the error is Correct the line as for the above error and try again.

DITOR



SPRITE EDITOR

Using the Program

Once you have loaded the program and started it running, (with the SYS 50300 command as detailed above) you will be presented with the editor's main menu which offers the following options:

1) SPRITE EDITOR
2) CHAR/SCREEN EDITOR
3) HELP SPRITES
4) HELP CHARS
5) DISK COMMANDS
6) DIR
7) DISK REPORT
8) SAVE EDITOR
9) LOAD

Pressing the corresponding key will call up the specified function. Options 1 and 2 call up the sprite editor and the character/background editor respectively. These will be explained in their own sections later on.

Options 3 and 4 give access tp brief reminders of all of the functions that are available in the relevant programs. These two screens will no doubt be of great use once you start to use the program.

Option 5 allows you to send the standard disk instructions to your disk drive. If you are unsure of what the commands are I have listed the main ones in Figure 1.

The DIR function will display a directory listing from any disk in the drive. However, because '3IN1' only uses program files (i.e.PRG) then only this type of file is listed to the screen. Also the size of the file is not given as it is not really that important.

Just in case you ever have any disk errors, I have included Option 7 which will read the error channel of the disk drive and report any errors.

Option 8 is extremely important. This function allows you to make more copies the program without having to use the Basic loaders. If you use this function then you will be prompted for the filename that you wish to call the program by. The default output device when you load this program is disk. If you are using tape then you will need to change the output device this is done by pressing F1. You will be able to tell which is currently being used for output as both this option and Option 9 will have either a '1' or an '8' after them. A '1' specifies an output device of 1 i.e. cassette while an '8' means device 8 which is disk.

The final command available from the main menu is LOAD. This will LOAD the specified file into the same area of memory that it was saved from. This means that you can load any of the files created with the editor programs from the main menu.

Disk Commands — **Figure 1**

IØ	Initialise disk
VØ	Validate disk
No:name,id	Format disk
RØ:new=0:old	Rename file
SØ:name	Scratch file

Using the Editors

Before I take a close look at the individual editor programs it is worth pointing out a few conventions.

Firstly all numerical inputs and outputs are in HEX. This is because most programmers work in hexadecimal since it is a lot easier when writing machine code than using decimal. Since this program was designed as a programmers tool it is obvious that it should use HEX. All inputs must be made up of two digits e.g. '00' or '03'.

A lot of the functions can be controlled by either the cursor keys or a joystick in port two. Since the joystick only has one fire button and it may need to either erase or set points, the 'F1' key is used to select its operation. On both editors a flag of either one or zero is used. One indicates that the joystick will set a point while a zero means that it will delete a point. Take a look at the labelled pictures of both editors to see where the flags are.

Alongside the joystick flag in both editors is the device flag. As with the main menu this can be either an 8 or 1. Again look at the pictures in order to see where the flag can be found.

The Sprite Editor

The sprite editor allows you to edit sprites in either multicolour or hi-res mode. Sprites $A0 to $FF can be edited with the editor. If you are unsure about sprite numbers then I suggest that you have read the section on sprites in the C64 manual. If you take a look at the picture you will see that there is quite a lot of information on the screen.

Firstly we have the actual sprite editing screen. This displays a blown up version of the sprite being edited. If you choose multicolour then the horizontal resolution will halve, exactly the same as with multicolour sprites. Unlike most sprite editors you actually design the sprite using the colour for each dot. This means that you don't have to think which combination of dots produces which colour. Simply press one to three to select the editing colour and hey presto! draw dots with it.

Colour changing is also extremely easy. Press shift one to five and the corresponding colour will go through all 16 possibilities. Changing colour mode is also

extremely easy simply press 'M' to enter multi-colour mode or 'H' for hi-res mode. If you want to reverse the sprite simply press CONTROL and R. Easy isn't it?

It's not really worth mentioning all of the available commands since they are all listed in Figure 2. However, a few functions do need further explanation.

At the bottom right hand corner of the screen there are four sprites referred to as sprites zero to three. Note these are NOT the same as sprite numbers but are just used as reference numbers for the four at the bottom of the screen. Usually these four positions hold the same sprites as that which is being edited. It is possible to expand these sprites using the left arrow ( ) and up arrow ( ) keys so that you can see the different combinations of sprite available. To alter the way that the sprite looks simply press one of the above keys followed by the corresponding sprite position number (0-3).

Pressing CONTROL AND P followed by a number allows you to move that numbered sprite around the bottom of the screen. This means that you can position the four sprites next to each other or even overlap them. This may not seem all that useful at first but it is possible to make each of these four sprites different. This means that you could define a large character of up to four sprites joining the sprites together at the bottom of the screen so that you can see what they look like. It is even possible to animate this section of the screen with the CONTROL N command and the Q and W keys. Pressing CONTROL and N followed by 00 will cause each of the four sprites at the bottom of the screen to become the same as the one being edited. If on the other hand after typing CONTROL and N you enter a number greater than 00 you can set up animations.

Animation is quite difficult to explain and is best figured out with practice. However I will do my best to explain how to set up and use this special animation function.

When you enter a number greater than 00 for the number of animations after a CONTROL N instruction the sprites at the bottom of the screen will change. If, for example, we had pressed 01 after CONTROL N, sprite 0 would be the same as the actual sprite $A0. Sprite 01 will be the same as $A1, Sprite 02 will be the same as $A2 etc. If we now press the keys W and Q we can increment and decrement the sprite numbers at the bottom of the screen giving the appearance of animation. If we press 'W', Sprite 00 will become actual sprite $A1, Sprite 01 will become actual sprite $A2 etc. If we had entered 04 after a CONTROL N instruction then the sprites would be incremented by four every time you pressed the 'W' KEY, i.e. sprite 00 would become $A4, Sprite 01 would become $A5 etc.

I did say that this form of animation was complicated but if you try it then I'm sure that it will all fall into place.

Just in case you have problems with this type of animation there is a simpler form. This is the 'A' instruction. This instruction will change all the sprites on the screen, including the large editing screen, in increments of one for a preset length. When you press 'A' you will be prompted at the top of the screen for the first sprite in the sequence and the last, then the sprites will be displayed in order. Pressing 'F' and 'S' will speed up and slow down the speed of this animation.

That just about sums it up for the sprite editor. I'm sure that you will find it very easy to use with a little practice and that you will find most of the instructions that you are ever likely to need.

Character Screen Editor

Both of these editors are present on the same screen. The top half is the character editor while the bottom is used as a small window over a larger screen.

Quite a lot of information is present on this screen and it is worth studying the commented picture in order to find where everything is.

For more experienced programmers I have included the provision of using two different character sets. In order to use the second set you must set up an interrupt raster on the graphics editing screen with the 'P' command while inside the background editor. Above the raster, character set one will be displayed, while below the raster you will be in the second character set. Character set one sits at $0800 and set two is at $2000.

Again it is worth looking at some of the available commands in more detail, a summary of them all can be found in Figure 3.

As with the sprite editor, characters can be edited in either multi-colour or hi-res mode, colours being chosen and changed as in the sprite editor.

Once you have entered a character you can place it anywhere within a defined background in the background editor. The 'J' key is used to move control between either the character editor or the background editor. You can see which mode you are in by seeing which cursor is flashing.

The background is defined with the CONTROL D command and the window

Sprite Editor Commands

Cursor/joystick	Move cursor
***FIRE 1**	Draw point
space/FIRE 0	Delete point
F1	Joystick fire function
M	Multicolour mode
H	Hi-res mode
1-3	Select drawing colour N.B. only colour 2 can be used in hi-res. 1 – Multi-colour 1 2 – Sprite colour 3 – Multi-colour 2
SHIFT 1-5	Change colour 4 – Foreground colour 5 – Background
G	Goto sprite number?
C	Copy sprite number?
+	Increase sprite number
-	Decrease sprite number
U	Move sprite up
D	down
L	left
R	right
DEL	Scroll row left
SHIFT DEL	Scroll row right
SHIFT HOME	Clear sprite
X	X-flip
Y	Y-flip
A	Animate input F: from T: to Press F for faster S for slower
CTRL L	LOAD data
CTRL S	SAVE sprite data
F3	Input/Output device

SPRITE BLOCK FUNCTIONS

CTRL P (0-3)	Position sprite with cursor keys
(0-3)	Expand sprite Y direction
(0-3)	Expand sprite X direction
CTRL N (N)	Animate group of N N=00 display editor sprite Q - decrease step W – increase step
STOP	Goto main menu

Figure 2

CHARACTER/SCREEN EDITOR

Cursor/joystick	Move cursor
***/FIRE 1**	Draw point
space/FIRE 0	Delete point
F1	Joystick fire function
M	Multicolour mode
H	Hi-res mode
1-3	Select drawing colour
SHIFT 1-5	Change colour 4 – Foreground colour 5 – Background
G	Goto character number?
C	Copy character number?
+	Increase character number
-	Decrease character number?
U	Move character up
D	down
L	left
R	right
SHIFT HOME	Clear character
S	Change character set (1) $0800 (2) $2000
CTRL F	Fetch character set to editor: DO = ROM characters OB = SET 1 20 = SET 2
X	X-Flip
Y	Y-Flip
CTRL R	Reverse character
F3	Input/Output device
CTRL L	LOAD data
CTRL S	SAVE character data Input start and end character for save
CTRL D	Define background size
CTRL B	Define start of window BH = High byte BL = Low byte
B	Define border character
J	Jump to background editor
STOP	Go to main menu

BACKGROUND EDITOR

Cursor/Joystick	Move cursor
***/FIRE**	Place character
G	Get character
+	Increase character number
-	Decrease character number
CTRL F	Fill window with character
W	Go to full size display cursor keys move screen W to exit
P	Position raster 00=at bottom of screen xx= at that character position
CTRL L	LOAD data
CTRL S	SDAVE background data
J	Jump back to character Editor

Figure 3

can be anything from two by two characters upwards, the maximum in either direction being 255 characters or $FF. Obviously your screen size is limited by the amount of memory available. If there is not enough room for your window then you will have to enter new values. I have made up to 32K of memory available for the window though I'm sure that you will find that you very rarely use this much. The two numbers in the middle of the screen show you where your window starts and finishes in memory.

One very important consideration for games programmers is where they are actually going to put their screen. The CONTROL B command will prompt you for the high byte and low byte for your screen position so that you can move it where you want. Do make sure that you don't overwrite any other programs in memory, such as the editor.

You may think that it is a little limiting to just see a small section of your total graphics screen at one time. I have therefore included the 'W' command which will switch to a full screen display in which you can move around the background, movement being controlled by the cursor keys only.

It is possible to set up a border character which is displayed around the smaller editing window. I usually leave this blank though you may try different effects by putting fancy borders around the screen. This does not apply to full screen mode.

Saving and Loading

As I said earlier, it is possible to load any type of file into memory from the main menu. It is also possible to load any type of file from within any of the other editors as well. However the I/O device is separate in each editor so you must change it in each section of the program.

Even though you can LOAD in any type of data from within any section of the program, you can only save each type of data from the correct editor. You must therefore be in the character editor in order to SAVE your user defined graphics. You must be in the sprite editor to save sprites and you must be in the background editor in order to save backgrounds.

Note

When you design a background, make sure tht you keep a note of the screen size that is defined, since a screen that is supposed to be 20 characters wide will look rather silly if the screen is set to 21 characters.

Examples

Since there is probably quite a lot of information to grasp about the editor in this issue of the magazine I will leave it there. Next month I will be giving you some sample screens, which you can see in the photographs accompanying this article, together with some more hints and tips about how to use the program.

3 IN 1 Editor will no doubt be updated continually. I will try to put updates in *Your Commodore* when they are available. In the meantime if you have any ideas or comments about this program then please write to me c/o *Your Commodore* and it will be forwarded to me.

I hope that you find the program as useful as many programmers have already done.

Stop Press

Since the text for this article was originally set, the 3 IN 1 EDITOR has been improved.

The main improvement is the addition of a pull down menu facility for accessing the commands. If you press the F7 key, whilst in any of the editors, a list of the available functions will be displayed. Move the selector up and down the list and press RETURN to select the option that you require.

A GRAB option has also been added. This will allow you to copy large areas of the background screen with ease as well as copy sprites into characters and vice versa. These functions are described in the HELP sections of the program and I will explain them in more detail next month.

PROGRAM: 3IN1 LOADER1

```
2000 FORL=0TO148:CX=0:FORD=0TO15:READA:CX=CX+A:POKE40960+L*16+D,A:NEXTD
2010 READA:IFA<>CXTHENPRINT"ERROR IN LINE";2040+(L*10):STOP
2020 NEXTL
2040 DATA0,174,101,168,189,164,170,141,28,208,120,169,49,141,20,3,1845
2050 DATA169,234,141,21,3,169,64,141,16,208,169,255,141,10,208,169,2118
2060 DATA80,141,11,208,162,0,138,157,64,3,157,128,3,232,224,64,1772
2070 DATA144,245,162,0,189,111,168,157,64,3,189,135,168,157,128,3,2023
2080 DATA232,224,24,144,239,169,63,141,21,208,173,102,168,141,134,2,2185
2090 DATA169,147,32,210,255,32,110,164,169,0,133,250,169,4,133,251,2228
2100 DATA169,0,141,110,168,141,109,168,169,160,141,53,5,141,133,5,1813
2110 DATA141,213,5,162,0,160,0,169,160,145,250,200,192,26,144,247,2214
2120 DATA32,37,171,232,224,23,144,237,162,7,189,77,170,41,63,24,1833
2130 DATA105,128,157,15,4,202,16,242,173,21,208,9,1,141,21,208,1651
2140 DATA32,105,170,173,86,170,41,15,10,141,23,208,173,87,170,41,1645
2150 DATA15,10,141,29,208,169,0,141,85,170,32,172,165,32,253,168,1790
2160 DATA32,203,166,173,24,4,24,105,128,141,24,4,173,25,4,24,1254
2170 DATA105,128,141,25,4,32,49,165,32,115,161,32,243,160,173,53,1618
2180 DATA169,24,105,48,141,0,4,173,76,170,24,105,48,141,1,4,1233
2190 DATA76,152,160,169,13,24,109,101,168,141,248,7,173,97,168,141,1947
2200 DATA253,7,174,163,170,208,15,141,250,7,141,251,7,141,252,7,2187
2210 DATA141,249,7,76,51,161,160,0,173,98,168,162,0,153,249,7,1855
2220 DATA24,105,1,232,200,236,163,170,144,5,173,98,168,162,0,192,2073
2230 DATA4,144,234,173,109,168,10,10,10,24,105,58,141,1,208,173,1572
2240 DATA110,168,10,10,10,24,105,32,141,0,208,162,5,189,167,170,1511
2250 DATA41,63,157,192,7,202,16,245,173,166,170,74,74,74,74,170,1898
2260 DATA189,165,168,141,198,7,173,166,170,41,15,170,189,165,168,141,2266
2270 DATA199,7,96,32,228,255,141,107,168,173,103,168,141,53,217,141,2229
2280 DATA37,208,173,104,168,141,133,217,141,41,208,141,42,208,141,43,2146
2290 DATA208,141,44,208,141,40,208,173,105,168,141,213,217,141,38,208,2394
2300 DATA169,32,141,55,5,141,135,5,141,215,5,173,106,168,141,32,1664
2310 DATA208,141,33,208,238,39,208,172,161,168,185,162,168,168,169,31,2459
2320 DATA153,55,5,173,141,2,141,108,168,173,107,168,201,71,208,20,1894
2330 DATA169,7,141,28,4,32,120,167,174,85,170,208,6,141,97,168,1717
2340 DATA141,98,168,96,76,142,174,201,67,208,24,169,3,32,251,162,2012
2350 DATA173,85,170,208,238,160,0,177,252,81,178,145,178,200,192,64,2501
2360 DATA144,245,96,201,68,208,39,32,186,165,160,60,162,0,177,252,2195
2370 DATA157,250,168,200,232,224,3,144,245,136,136,136,177,252,200,200,2860
2380 DATA200,145,252,136,136,136,136,16,243,160,0,76,237,162,201,18,2254
2390 DATA208,17,32,186,165,160,0,177,252,73,255,145,252,200,192,63,2377
2400 DATA144,245,96,201,19,208,9,169,0,141,110,168,141,109,168,96,2024
2410 DATA201,136,208,70,173,21,208,41,254,141,21,208,169,42,133,250,2276
2420 DATA169,4,133,251,162,0,160,0,169,160,145,250,200,192,13,144,2152
2430 DATA249,32,37,171,232,224,15,144,237,169,42,133,250,169,216,133,2453
2440 DATA251,162,0,160,0,173,102,168,145,250,200,192,13,144,249,32,2241
2450 DATA37,171,232,224,15,144,236,76,51,171,201,87,208,11,173,98,2135
2460 DATA168,24,109,163,170,141,98,168,96,201,81,208,11,173,98,168,2077
2470 DATA56,237,163,170,141,98,168,96,201,133,208,12,173,53,169,24,2102
2480 DATA105,1,41,1,141,53,169,96,201,85,208,86,32,186,165,160,1730
2490 DATA0,177,252,153,250,168,200,192,3,144,246,136,136,136,200,200,2593
2500 DATA200,177,252,136,136,136,145,252,200,192,60,144,241,162,0,189,2622
2510 DATA250,168,145,252,200,232,224,3,144,245,96,141,28,4,32,120,2284
2520 DATA167,32,186,165,165,252,133,178,165,253,133,179,173,97,168,141,2587
2530 DATA181,168,173,85,168,141,97,168,32,186,165,173,181,168,141,97,2324
2540 DATA168,96,201,89,208,45,32,186,165,160,0,177,252,153,184,168,2284
2550 DATA200,192,63,144,246,160,0,162,60,189,184,168,145,252,200,189,2554
2560 DATA185,168,145,252,200,189,186,168,145,252,200,202,202,202,192,63,2951
2570 DATA144,231,96,201,147,208,15,32,186,165,160,0,169,0,145,252,2151
2580 DATA200,192,63,208,247,96,201,86,240,3,76,40,164,32,186,165,2201
2590 DATA160,0,177,252,153,184,168,200,192,63,144,246,173,101,168,208,2589
2600 DATA86,162,0,142,183,168,189,184,168,141,181,168,162,0,142,182,2258
2610 DATA168,160,7,173,181,168,57,87,168,240,10,173,182,168,24,125,2091
2620 DATA87,168,141,182,168,232,136,224,8,144,232,174,183,168,173,182,2602
2630 DATA168,157,184,168,232,224,63,208,202,162,2,160,0,189,184,168,2471
2640 DATA145,252,200,189,183,168,145,252,200,189,182,168,145,252,200,232,3102
2650 DATA232,232,192,63,144,231,96,162,0,142,183,168,189,184,168,141,2527
2660 DATA181,168,162,0,142,182,168,160,6,173,181,168,57,87,168,240,2243
2670 DATA10,173,182,168,24,125,87,168,141,182,168,232,200,173,181,168,2382
2680 DATA57,87,168,240,10,173,182,168,24,125,87,168,141,182,168,232,2212
2690 DATA136,136,136,224,8,144,210,174,183,168,173,182,168,157,184,168,2551
2700 DATA232,224,63,144,180,76,185,163,201,49,144,16,201,52,176,12,2118
2710 DATA56,233,49,141,161,168,96,170,254,103,168,96,201,33,144,12,2085
2720 DATA201,36,176,8,56,233,33,170,254,103,168,96,201,36,208,6,1985
2730 DATA238,102,168,76,110,164,201,37,208,4,238,106,168,96,201,43,2160
2740 DATA208,4,238,97,168,96,201,45,208,27,206,97,168,96,173,102,2134
2750 DATA168,162,0,157,0,216,157,250,216,157,244,217,157,238,218,232,2789
2760 DATA224,250,144,239,96,201,42,208,3,76,36,167,201,82,208,11,2188
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2780 DATA101,168,240,3,32,33,168,76,33,168,201,3,208,13,88,104,1639
2790 DATA104,169,0,141,21,208,169,147,76,210,255,201,20,208,34,173,2136
2800 DATA101,168,240,3,32,202,164,76,202,164,32,186,165,
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172,109,168,2184
2810 DATA140,250,168,173,250
,168,10,24,109,250,168,168,2
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2820 DATA168,201,148,208,32,
173,101,168,240,3,32,240,164
,76,240,164,2358
2830 DATA32,186,165,172,109,
168,140,250,168,173,250,168,
10,24,109,250,2374
2840 DATA168,168,76,255,167,
201,32,208,3,76,80,167,201,1
7,240,65,2124
2850 DATA201,145,240,46,201,
29,240,74,201,157,240,108,17
3,49,169,208,2481
2860 DATA33,173,50,169,208,4
3,173,52,169,208,55,173,51,1
69,208,88,2022
2870 DATA96,173,48,169,240,1
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2890 DATA96,173,109,168,201,
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2930 DATA240,16,206,110,168,
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2940 DATA168,96,169,22,76,13
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41,133,250,1982
2950 DATA169,4,133,251,32,18
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2960 DATA0,133,253.6,252,38,
253,6,252,38,253,6,252,38,25
3,6,2039
2970 DATA252,38,253,6,252,38
,253,6,252,38,253,165,253,24
,105,0,2188
2980 DATA133,253,96,162,0,16
0,0,140,95,168,177,252,141,9
6,168,173,2214
2990 DATA101.168,240,114,160
,0,173,96,168,57,87,168.141,
99,168,200,2140
3000 DATA173,96,168,57,87,16
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,99,168,78,99,168,200,200,76
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,255,173,100,168,145,254,200
,145,254,200,192,2952
3060 DATA8,144,147,76,144,16
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,240,5,1839
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3080 DATA165,251,105,212,133
,255,173,104,168,145,254,200
,192,8,144,216,2725
3090 DATA172,95,168,200,165,
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,105,0,133,2224
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,252,165,2196
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68,41,15,2100
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,25,4,173,97,168,74,74,74,74
,41,15,1646
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,24,4,169,32,141,28,4,141,30
,4,141,1545
3150 DATA31,4,96,32,186,165,
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3160 DATA200,200,202,76,251,
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,159,168,152,2388
3170 DATA24,109,159,168,141,
159,168,173,110,168,41,7,168
,185,87,168,2035
3180 DATA141,160,168,96,32,8
0,167,173,101,168,208,14,32,
243,166,172,2121
3190 DATA159,168,177,252,13,
160,168,145,252,96,173,161,1
68,240,7,201,2540
3200 DATA1,240,233,32,44,167
,238,110,168,32,44,167,206,1
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3210 DATA173,101,168,208,22,
32,243,166,173,160,168,73,25
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3220 DATA172,159,168,177,252
,45,160,168,145,252,96,32,85
,167,238,110,2426
3230 DATA168,32,85,167,206,1
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3240 DATA31,153,30,4,140,181
,168,32,228,255,201,0,240,24
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3250 DATA168,153,30,4,201,3,
208,6,169,1,141,85,170,96,20
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3260 DATA144,221,201,58,176,
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3270 DATA201,71,176,203,72,5
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,55,153,1864
3280 DATA85,168,32,228,255,2
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,192,2,144,2485
3290 DATA174,173,85,168,10,1
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3300 DATA228,255,201,13,240,
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3310 DATA96,32,186,165,160,0
,32,255,167,200,192,63,144,2
48,96,177,2213
3320 DATA252,74,145,252,8,20
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3330 DATA40,106,145,252,144,
10,136,136,177,252,73,128,14
5,252,200,200,2396
3340 DATA96,32,186,165,160,2
,32,49,168,200,200,200,192,6
3,144,246,2135
3350 DATA96,177,252,10,145,2
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52,8,136,2128
3360 DATA177,252,40,42,145,2
52,8,200,200,40,169,0,113,25
2,145,252,2287
3370 DATA136,136,200,200,96,
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025
3380 DATA96,160,160,2,8,0,14
,0,8,13,6,3,0,11,16,255,752
3390 DATA0,0,129,0,0,129,0,0
,129,0,0,129,0,0,129,0,645
3400 DATA0,129,0,0,255,0,0,2
55,255,0,128,1,0,128,1,0,115
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3410 DATA128,1,0,128,1,0,128
,1,0,128,1,0,255,255,0,35,10
61
3420 DATA128,1,0,80,160,48,4
9,50,51,52,53,54,55,56,57,1,
895
3430 DATA2,3,4,5,6,1,0,0,234
,234,234,234,234,234,234,234
,1893
3440 DATA234,234,234,234,234
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,234,234,234,234,3744
3450 DATA234,234,234,234,234
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3460 DATA234,234,234,234,234
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3470 DATA234,234,234,234,234
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,141,2188
3480 DATA49,169,141,50,169,1
41,52,169,141,48,169,141,51,
169,173,0,1832
3490 DATA220,74,176,3,238,49
,169,74,176,3,238,50,169,74,
176,3,1892
3500 DATA238,51,169,74,176,3
,238,52,169,74,176,3,238,48,
169,96,1974
3510 DATA0,0,0,0,0,160,0,1
69,6,141,28,4,169,62,141,880
3520 DATA29,4,140,73,170,185
,30,4,0,0,0,0,0,1,0,1,637
5000 PRINT"(CLR)NEW":PRINT"(
DOWN)(DOWN)LOAD"+CHR$(34)+"3
IN1 LOADER2"+CHR$(34)+",8"
5010 REM CHANGE ,8 ABOVE TO
,1 FOR TAPE
5020 PRINT"(DOWN)(DOWN)(DOWN
)(DOWN)RUN"
5030 POKE631,13:POKE632,13:P
OKE633,13:POKE198,3:PRINT"(H
OME)"
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3 into 1 EDITOR

PROGRAM: 3IN1 LOADER2

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2000 FORL=0TO148:CX=0:FORD=0TO15:READA:CX=CX+A:POKE43335+L*16+D,A:NEXTD
2010 READA:IFA<>CXTHENPRINT"ERROR IN LINE";2040+(L*10):STOP
2020 NEXTL
2040 DATA4,73,128,153,30,4,32,228,255,172,73,170,201,3,208,8,1742
2050 DATA169,1,141,85,170,76,134,169,201,20,240,48,201,13,240,24,1932
2060 DATA201,32,144,215,201,97,176,211,192,9,240,207,153,63,170,41,2352
2070 DATA63,153,30,4,200,76,66,169,192,0,240,191,140,75,170,169,1938
2080 DATA32,162,0,157,28,4,232,224,12,144,248,96,192,0,240,171,1942
2090 DATA169,32,153,30,4,136,76,66,169,169,19,141,28,4,32,251,1479
2100 DATA162,173,85,170,208,35,173,85,168,201,128,144,236,165,252,133,2518
2110 DATA180,165,253,133,181,169,5,141,28,4,32,251,162,173,85,170,2132
2120 DATA208,7,173,85,168,201,128,144,236,96.174,76,170,173,21,208,2268
2130 DATA141,74,170,169,0,141,21,208,138,160,255,32,186,255,169,19,2138
2140 DATA32,210,255,173,75,170,162,63,160,170,32,189,255,169,29,32,2176
2150 DATA210,255,165,252,24,105,63,170,165,253,105,0,168,169,180,32,2316
2160 DATA216,255,173,74,170,141,21,208,96,173,76,170,170,160,255,32,2390
2170 DATA186,255,169,19,32,210,255,173,21,208,141,74,170,169,0,141,2223
2180 DATA21,208,173,75,170,162,63,160,170,32,189,255,169,0,32,213,2092
2190 DATA255,173,74,170,141,21,208,96,0,0,0,0,0,0,0,0,1138
2200 DATA0,0,0,0,0,8,83,80,82,73,84,69,32,35,0,12,558
2210 DATA10,20,70,20,70,170,170,220,220,1,2,4,8,16,253,251,1505
2220 DATA247,239,162,0,160,0,189,88,170,41,127,24,105,215,153,2,1922
2230 DATA208,144,12,173,16,208,29,97,170,141,16,208,76,143,170,173,1984
2240 DATA16,208,61,101,170,141,16,208,189,92,170,41,127,24,105,115,1784
2250 DATA153,3,208,200,200,232,224,4,144,204,96,0,0,0,254,8,1930
2260 DATA66,65,78,75,32,36,80,79,83,73,84,73,79,78,0,69,1050
2270 DATA88,80,65,78,68,32,88,0,69,88,80,65,78,68,32,89,1068
2280 DATA0,76,79,65,68,0,83,65,86,69,0,68,69,86,73,67,954
2290 DATA69,0,65,78,73,77,65,84,69,0,78,85,77,66,69,82,1037
2300 DATA0,77,6 ,76,84,73,32,67,79,76,0,72,73,82,69,83,1028
2310 DATA0,67,72,65,82,45,66,65,78,75,0,67,79,80,89,32,962
2320 DATA67,72,65,82,83,255,4,172,232,171,204,171,122,172,98,172,2142
2330 DATA89,172,168,172,72,172,138,172,157,172,19,173,36,173,165,250,2300
2340 DATA24,105,40,133,250,165,251,105,0,133,251,96,32,137,171,32,1925
2350 DATA228,255,201,17,208,18,173,18,173,24,105,1,201,12,144,2,1780
2360 DATA169,0,141,18,173,76,51,171,201,145,208,18,173,18,173,56,1791
2370 DATA233,1,201,255,208,2,169,11,141,18,173,76,51,171,201,13,1924
2380 DATA208,20,173,18,173,10,170,189,13,171,141,123,171,189,14,171,1954
2390 DATA141,124,171,76,157,172,201,3,240,7,201,136,240,3,76,51,1999
2400 DATA171,96,169,84,133,250,169,4,133,251,162,0,142,17,173,160,2114
2410 DATA0,189,173,170,232,201,255,240,43,201,0,240,28,41,63,72,2148
2420 DATA173,17,173,205,18,173,240,4,104,76,183,171,104,76,186,171,2074
2430 DATA24,105,128,145,250,200,76,152,171,32,37,171,238,17,173,160,2079
2440 DATA0,76,152,171,96,169,30,141,28,4,32,120,167,201,4,176,1567
2450 DATA15,170,173,85,170,208,9,173,86,170,93,96,170,141,86,170,2015
2460 DATA96,169,31,141,28,4,32,120,167,201,4,176,243,170,173,85,1840
2470 DATA170,208,237,173,87,170,93,96,170,141,87,170,96,169,16,141,2224
2480 DATA28,4,32,120,167,174,85,170,208,242,201,4,176,238,141,162,2152
2490 DATA170,32,228,255,174,162,170,201,32,240,225,201,3,240,221,201,2755
2500 DATA17,208,3,254,92,170,201,29,208,3,254,88,170,201,157,208,2263
2510 DATA3,222,88,170,201,145,208,3,222,92,170,32,105,170,76,24,1931
2520 DATA172,169,14,141,28,4,32,120,167,174,85,170,208,3,141,163,1791
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2540 DATA170,208,247,32,160,169,173,85,170,208,239,32,209,169,104,104,2479
2550 DATA76,88,160,32,54,169,173,85,170,208,223,32,16,170,104,104,1864
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2590 DATA168,141,249,168,169,20,141,28,4,32,120,167,173,85,170,208,2043
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2610 DATA240,8,144,6,173,249,168,141,97,168,172,248,168,152,72,32,2238
2620 DATA172,165,32,203,166,32,243,160,104,168,136,16,240,32,228,255,2352
2630 DATA201,83,208,3,238,248,168,201,70,208,3,206,248,168,201,32,2486
2640 DATA240,7,201,3,240,3,76,206,172,96,11,9,169,2,141,28,1604
2650 DATA4,32,120,167,174,85,170,208,3,141,166,170,96,32,172,165,1905
2660 DATA32,165,173,32,217,173,32,228,255,201,17,208,18,173,231,174,2329
2670 DATA24,105,1,201,3,144,2,169,0,141,231,174,76,159,173,201,1804
2680 DATA145,208,18,173,231,174,56,233,1,201,255,208,2,169,2,141,2217
2690 DATA231,174,76,159,173,201,29,208,18,173,230,174,24,105,1,201,2177
2700 DATA3,208,2,169,0,141,230,174,76,159,173,201,157,208,18,173,2092
2710 DATA230,174,56,233,1,201,255,208,2,169,2,141,230,174,76,159,2311
2720 DATA173,201,3,208,1,96,201,13,208,6,32,15,174,76,159,173,1739
2730 DATA201,32,208,1,96,76,39,173,32,172,165,76,39,173,169,41,1693
2740 DATA133,250,169,4,133,251,174,230,174,224,0,240,17,165,250,24,2438
2750 DATA105,8,133,250,165,251,105,0,133,251,202,76,176,173,172,231,2431
2760 DATA174,192,0,240,12,162,7,32,37,171,202,16,250,136,76,200,1907
2770 DATA173,96,162,0,160,0,169,160,145,250,165,251,24,105,212,133,2205
2780 DATA251,173,102,168,145,250,165,251,56,233,212,133,251,200,192,8,2790
2790 DATA144,228,32,37,171,173,231,174,201,2,208,6,232,2
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TIMETRAX

Just after the Holocaust you wouldn't think anything else could go wrong now would you? There you were sitting peacefully in your cellar, trying to have the nervous breakdown you've earned and the next thing you know you're setting out through the Portals to stop the Evil One rending asunder the fabric of Creation. Some days nothing goes right . . .

An amazing, all-action, animated adventure across the ages of Man to save civilisation. You'll be able to start playing it in minutes but you mightn't finish it for years!

WARNING: This game could damage your social life. TIMETRAX is an addictive habit.

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Telephone: (01) 439 0666.

MIND GAMES

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24,5,144,2212
2800 DATA211,96,232,224,8,14
4,205,96,169,3,141,28,4,32,1
20,167,1880
2810 DATA174,85,170,208,102,
133,250,169,0,133,251,162,2,
6,250,38,2133
2820 DATA251,202,16,249,165,
251,24,109,166,170,133,251,3
2,186,165,165,2535
2830 DATA252,24,109,230,174,
133,252,165,253,105,0,133,25
3,174,231,174,2662
2840 DATA224,0,240,17,165,25
2,24,105,24,133,252,165,253,
105,0,133,2092
2850 DATA253,202,76,71,174,1
60,0,177,250,145,252,165,252
,24,105,2,2308
2860 DATA133,252,165,253,105
,0,133,253,173,231,174,201,2
,240,6,200,2521
2870 DATA192,8,144,227,96,20
0,192,5,144,221,96,169,32,14
1,28,4,1899
2880 DATA141,30,4,141,31,4,9
6,201,12,208,3,76,122,172,20
1,19,1461
2890 DATA208,3,76,98,172,201
,77,208,11,173,101,168,240,3
,76,157,1972
2900 DATA172,76,138,172,201,
80,208,3,76,4,172,201,78,208
,3,76,1868
2910 DATA72,172,201,2,208,3,
32,19,173,201,95,208,3,76,23
2,171,1868
2920 DATA201,94,208,3,76,204
,171,201,65,208,3,76,168,172
,201,6,2057
2930 DATA208,3,76,36,173,201
,134,208,3,76,89,172,76,231,
161,0,1847
2940 DATA2,0,0,0,0,0,0,0,0,3
2,185,189,169,0,141,28,746
2950 DATA208,141,7,208,120,1
69,4,141,23,32,201,189,169,0
,141,28,1781
2960 DATA208,141,7,208,120,1
69,4,141,23,208,141,29,208,3
2,14,189,1842
2970 DATA32,79,190,173,89,19
0,240,3,32,25,192,169,0,141,
13,189,1757
2980 DATA141,44,195,32,63,18
1,32,245,182,32,130,179,32,3
3,176,32,1729
2990 DATA94,175,32,100,179,1
62,0,160,8,173,238,189,240,4
,162,0,1916
3000 DATA160,32,142,236,189,
140,237,189,162,0,173,161,18
0,240,2,162,2405
3010 DATA134,142,28,208,76,3
4,175,169,13,141,251,7,24,10
9,161,180,1852
3020 DATA141,248,7,173,168,1
80,10,10,10,24,105,58,141,1,
208,173,1657
3030 DATA178,180,10,10,10,24
,105,32,141,0,208,162,5,189,
230,189,1673
3040 DATA41,63,157,14,4,202,
16,245,162,2,189,241,189,41,
63,157,1786
3050 DATA38,5,202,16,245,173
,238,189,24,105,49,141,41,5,
173,161,1805
3060 DATA180,10,10,10,10,24,
105,8,141,55,184,173,89,190,
240,57,1486
3070 DATA174,158,180,169,0,1
41,90,190,141,16,208,224,40,
144,11,138,2024
3080 DATA56,233,40,170,238,9
0,190,76,194,175,138,201,29,
144,5,162,2141
3090 DATA8,142,16,208,10,10,
10,24,105,24,141,6,208,173,9
0,190,1365
3100 DATA10,10,10,24,105,146
,141,7,208,173,161,180,240,8
,173,164,1760
3110 DATA180,41,7,141,164,18
0,160,0,162,0,177,252,157,19
2,3,232,2048
3120 DATA232,232,200,192,8,1
44,243,173,119,181,24,105,48
,141,11,4,2057
3130 DATA173,127,182,24,105,
48,141,12,4,96,32,228,255,72
,173,114,1786
3140 DATA181,240,14,173,119,
181,240,6,32,217,183,76,56,1
76,32,16,1942
3150 DATA184,104,141,167,180
,173,163,180,141,151,216,141
,37,208,141,34,2361
3160 DATA208,173,164,180,141
,55,217,173,165,180,141,231,
216,141,35,208,2628
3170 DATA174,161,180,208,3,1
73,164,180,141,41,208,141,40
,208,169,32,2223
3180 DATA141,153,4,141,233,4
,141,57,5,238,39,208,238,42,
208,172,2024
3190 DATA229,180,185,230,180
,168,169,31,153,153,4,173,16
7,180,32,45,2279
3200 DATA196,173,167,180,32,
57,196,173,167,180,201,71,20
8,17,169,7,2194
3210 DATA141,28,4,32,25,180,
174,13,189,208,57,141,158,18
0,96,201,1827
3220 DATA133,208,12,173,119,
181,24,105,1,41,1,141,119,18
1,96,201,1736
3230 DATA49,208,6,169,0,141,
229,180,96,201,50,208,6,169,
1,141,1854
3240 DATA229,180,96,201,51,2
08,6,169,2,141,229,180,96,20
1,33,208,2230
3250 DATA4,238,163,180,96,20
1,35,208,6,238,164,180,76,23
7,176,201,2403
3260 DATA34,208,34,238,165,1
80,173,164,180,141,38,208,17
4,161,180,240,2518
3270 DATA3,24,105,8,162,0,15
7,144,217,157,88,218,157,32,
219,232,1923
3280 DATA224,200,144,242,96,
201,37,208,6,238,166,180,76,
79,190,201,2488
3290 DATA36,208,6,238,162,18
0,76,14,179,201,43,208,4,238
,158,180,2131
3300 DATA96,201,136,208,3,76
,91,190,201,45,208,4,206,158
,180,96,2099
3310 DATA201,42,208,3,76,217
,183,201,17,208,12,173,168,1
80,24,105,2018
3320 DATA1,41,7,141,168,180,
96,201,29,208,22,173,161,180
,240,3,1851
3330 DATA32,90,177,173,178,1
80,24,105,1,41,7,141,178,180
,240,219,1966
3340 DATA96,201,157,208,20,1
73,161,180,240,3,32,116,177,
173,178,180,2295
3350 DATA56,233,1,41,7,141,1
78,180,96,201,145,208,12,173
,168,180,2020
3360 DATA56,233,1,41,7,141,1
68,180,96,201,32,208,3,76,16
,184,1643
3370 DATA201,3,208,3,76,31,1
79,201,85,208,3,76,170,179,2
01,68,1892
3380 DATA208,3,76,194,179,20
1,76,208,3,76,218,179,201,82
,208,3,2115
3390 DATA76,243,179,201,147,
208,11,169,0,168,145,252,200
,192,8,144,2343
3400 DATA249,96,201,67,208,2
4,169,3,32,231,178,173,13,18
9,208,13,2054
3410 DATA160,0,177,252,17,17
8,145,178,200,192,8,144,245,
96,201,18,2211
3420 DATA208,14,160,0,177,25
2,73,255,145,252,200,192,8,1
44,245,96,2421
3430 DATA201,74,208,3,76,83,
185,201,89,208,28,160,0,177,
252,153,2098
3440 DATA169,180,200,192,8,1
44,246,160,0,162,7,189,169,1
80,145,252,2403
3450 DATA200,202,192,8,144,2
45,96,201,88,208,3,76,128,17
8,201,87,2257
3460 DATA208,16,169,0,141,7,
208,32,20,188,173,89,190,240
,231,76,1988
3470 DATA25,192,172,117,181,
240,6,32,117,178,76,108,177,
172,118,181,2092
3480 DATA240,6,32,117,178,76
,82,177,172,115,181,240,6,32
,117,178,1949
3490 DATA76,132,177,172,116,
181,240,6,32,117,178,76,66,1
77,201,83,2030
3500 DATA208,11,173,238,189,
24,105,1,41,1,141,238,189,96
,160,170,1985
3510 DATA162,0,232,208,253,2
00,208,248,96,160,7,177,252,
153,169,180,2705
3520 DATA136,16,248,173,161,
180,208,4,0,0,0,0,0,1,0,1,11
28
5000 PRINT"(CLR)NEW":PRINT"(
DOWN)(DOWN)LOAD"+CHR$(34)+"3
IN1 LOADER3"+CHR$(34)+",8"
5010 REM CHANGE ,8 ABOVE TO
,1 FOR TAPE
5020 PRINT"(DOWN)(DOWN)(DOWN
)(DOWN)RUN"
5030 POKE631,13:POKE632,13:P
OKE633,13:POKE198,3:PRINT"(H
OME)"
```

3 into 1 EDITOR

PROGRAM: 3IN1 LOADER3

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2000 FORL=0TO148:CX=0:FORD=0TO15:READA:CX=CX+A:POKE45709+L*16+D,A:NEXTD
2010 READA:IFA<>CXTHENPRINT"ERROR IN LINE";2040+(L*10):STOP
2020 NEXTL
2040 DATA208,37,160,0,169,0,141,177,180,185,169,180,162,0,14,177,1959
2050 DATA180,74,144,3,238,177,180,232,224,8,144,242,173,177,180,145,2521
2060 DATA252,200,192,8,144,222,96,160,0,169,0,141,177,180,185,169,2295
2070 DATA180,162,0,14,177,180,14,177,180,74,144,3,238,177,180,74,1974
2080 DATA144,6,238,177,180,238,177,180,232,224,4,144,230,173,177,180,2704
2090 DATA145,252,200,192,8,144,210,96,162,0,141,28,4,32,25,180,1819
2100 DATA32,100,179,165,252,133,178,165,253,133,179,173,158,180,141,249,2670
2110 DATA180,173,146,180,141,158,180,32,100,179,173,249,180,141,158,180,2550
2120 DATA96,173,162,180,162,0,157,0,216,157,200,216,232,224,200,144,2519
2130 DATA245,96,88,104,104,169,147,32,210,255,169,0,141,21,208,120,2109
2140 DATA169,121,141,25,208,169,240,141,26,208,169,21,141,24,208,169,2180
2150 DATA8,141,22,208,169,1,141,14,220,169,49,141,20,3,169,234,1709
2160 DATA141,21,3,88,162,0,169,32,157,144,5,157,88,6,157,32,1362
2170 DATA7,232,224,200,144,242,96,173,158,180,133,252,169,0,133,253,2596
2180 DATA6,252,38,253,6,252,38,253,6,252,38,253,165,253,24,109,2198
2190 DATA237,189,133,253,96,173,158,180,41,15,168,185,233,180,141,21,2403
2200 DATA4,173,158,180,74,74,74,74,41,15,168,185,233,180,141,20,1794
2210 DATA4,169,32,141,28,4,141,30,4,141,31,4,96,160,0,177,1162
2220 DATA252,141,62,181,200,177,252,136,145,252,200,192,7,144,245,173,2759
2230 DATA62,181,145,252,96,160,7,177,252,141,62,181,136,177,252,200,2481
2240 DATA145,252,136,192,0,208,245,173,62,181,145,252,96,173,161,180,2601
2250 DATA240,3,32,226,179,160,0,177,252,10,144,2,9,1,145,252,1832
2260 DATA200,192,8,144,242,96,173,161,180,240,3,32,251,179,160,0,2261
2270 DATA177,252,74,144,2,9,128,145,252,200,192,8,144,242,96,32,2097
2280 DATA100,179,172,178,180,185,148,180,141,228,180,96,160,0,169,32,2328
2290 DATA141,31,4,169,31,153,30,4,140,249,180,32,228,255,201,0,1848
2300 DATA240,241,172,249,180,153,30,4,201,3,208,6,169,1,141,13,2011
2310 DATA189,96,201,48,144,221,201,58,176,6,56,233,48,76,96,180,2029
2320 DATA201,65,144,207,201,71,176,203,72,56,233,64,153,30,4,104,1984
2330 DATA56,233,55,153,146,180,32,228,255,201,0,208,249,172,249,180,2597
2340 DATA200,192,2,144,174,173,146,180,10,10,10,10,24,109,147,180,1711
2350 DATA141,146,180,32,228,255,201,13,240,7,201,20,208,245,76,25,2218
2360 DATA180,173,146,180,96,0,0,128,64,32,16,8,4,2,1,0,1030
2370 DATA0,0,0,0,0,30,32,17,12,6,3,0,234,234,234,234,1036
2380 DATA234,234,234,234,0,0,255,0,0,195,0,0,195,0,0,195,1776
2390 DATA0,0,195,0,0,195,0,0,195,0,0,255,0,0,255,255,1350
2400 DATA0,192,3,0,192,3,0,192,3,0,192,3,0,192,3,0,975
2410 DATA192,3,0,255,255,0,0,0,0,0,80,160,48,49,50,51,1143
2420 DATA52,53,54,55,56,57,1,2,3,4,5,6,1,0,0,234,583
2430 DATA234,234,234,234,234,234,234,234,234,234,234,234,234,234,234,234,3744
2440 DATA234,234,234,234,234,234,234,234,234,234,234,234,234,234,234,234,3744
2450 DATA234,234,234,234,234,234,234,234,234,234,234,234,234,234,234,234,3744
2460 DATA234,234,234,234,234,234,234,234,234,234,234,234,234,234,234,6,3516
2470 DATA0,0,169,0,141,115,181,141,116,181,141,118,181,141,114,181,1920
2480 DATA141,117,181,173,0,220,74,176,3,238,115,181,74,176,3,238,2110
2490 DATA116,181,74,176,3,238,117,181,74,176,3,238,118,181,74,176,2126
2500 DATA3,238,114,181,96,0,0,0,0,0,0,160,0,169,6,141,1108
2510 DATA28,4,169,62,141,29,4,140,124,182,185,30,4,73,128,153,1456
2520 DATA30,4,32,228,255,172,124,182,201,3,240,52,201,20,240,56,2040
2530 DATA201,13,240,24,201,32,144,223,201,97,176,219,192,9,240,215,2427
2540 DATA153,114,182,41,63,153,30,4,200,76,132,181,192,0,240,199,1960
2550 DATA140,126,182,169,32,162,0,157,27,4,232,224,13,144,248,96,1956
2560 DATA169,1,141,13,189,76,192,181,192,0,240,171,169,32,153,30,1949
2570 DATA4,136,76,132,181,169,19,141,28,4,32,231,178,173,146,180,1830
2580 DATA201,128,144,241,165,252,133,180,165,253,133,181,169,5,141,28,2519
2590 DATA4,32,231,178,173,146,180,201,128,144,241,96,174,127,182,173,2410
2600 DATA21,208,141,125,182,169,0,141,21,208,138,160,255,32,186,255,2242
2610 DATA169,19,32,210,255,173,126,182,162,114,160,182,32,189,255,169,2429
2620 DATA29,32,210,255,165,252,170,165,253,168,169,180,32,216,255,173,2724
2630 DATA125,182,141,21,208,96,173,127,182,170,160,255,32,186,255,169,2482
2640 DATA19,32,210,255,173,21,208,141,125,182,169,0,141,21,208,173,2078
2650 DATA126,182,162,114,160,182,32,189,255,169,0,32,213,255,173,125,2369
2660 DATA182,141,21,208,96,0,0,0,0,0,0,0,0,0,0,7,655
2670 DATA0,0,8,169,1,141,25,208,238,52,184,173,52,184,208,18,1661
2680 DATA169,21,141,24,208,169,8,141,22,208,169,130,141,18,208,76,1853
2690 DATA49,234,201,1,208,63,173,55,184,141,22,208,173,53,184,141,2090
2700 DATA24,208,173,239,189,240,52,169,0,141,240,189,173,168,187,56,2448
2710 DATA237,239,189,72,173,240,189,233,0,141,240,189,104,24,105,7,2382
2720 DATA201,14,176,12,10,10,10,24,105,150,141,18,208,76,129,234,1518
2730 DATA173,240,189,240,6,173,54,184,141,24,208,169,0,141,18,208,2168
2740 DATA169,255,141,52,184,76,129,234,173,161,180,208,78,32,100,179,2351
2750 DATA169,41,133,250,169,4,133,251,162,0,160,0,140,124,182,138,2056
2760 DATA168,177,252,172,124,182,57,148,180,208,5,169,32,76,31,183,2164
2770 DATA169,160,145,250,32,189,183,173,164,180,145,250,32,203,183,200,2658
2780 DATA192,8,144,216,232,32,58,183,224,8,144,206,96,165,250,24,2182
2790 DATA105,40,133,250,165,251,105,0,133,251,96,32,100,179,169,41,2050
2800 DATA133,250,169,4,133,251,162,0,160,0,140,124,182,169,0,141,2018
2810 DATA56,184,138,168,177,252,141,57,184,172,124,182,57,148,180,240,2460
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2820 DATA5,169,2,141,56,184,173,57,184,200,57,148,180,240,3,238,2037
2830 DATA56,184,136,173,56,184,208,5,169,32,76,140,183,169,160,145,2076
2840 DATA250,200,145,250,32,189,183,172,56,184,240,15,185,57,184,168,2510
2850 DATA185,162,180,172,124,182,145,250,200,145,250,32,203,183,172,124,2709
2860 DATA182,200,200,192,8,144,163,232,32,58,183,224,8,144,153,96,2219
2870 DATA165,250,24,105,0,133,250,165,251,105,212,133,251,96,165,250,2555
2880 DATA56,233,0,133,250,165,251,233,212,133,251,96,173,161,180,208,2735
2890 DATA14,32,12,180,172,168,180,177,252,13,228,180,145,252,96,32,2133
2900 DATA16,184,173,229,180,24,105,1,41,2,240,3,32,222,183,173,1808
2910 DATA229,180,24,105,1,41,1,240,9,238,178,180,32,222,183,206,2069
2920 DATA178,180,96,173,161,180,240,9,238,178,180,32,30,184,206,178,2443
2930 DATA180,32,12,180,172,168,180,173,228,180,73,255,141,228,180,177,2559
2940 DATA252,45,228,180,145,252,96,255,18,24,8,0,0,1,3,2,1509
2950 DATA169,144,133,250,169,5,133,251,173,160,187,133,182,173,161,187,2610
2960 DATA133,183,173,163,187,56,237,168,187,170,224,1,240,18,165,182,2487
2970 DATA24,109,162,187,133,182,165,183,105,0,133,183,202,76,87,184,2115
2980 DATA162,6,165,182,56,237,162,187,133,182,165,183,233,0,133,183,2369
2990 DATA202,16,239,165,182,56,233,21,133,182,165,183,233,0,133,183,2326
3000 DATA165,182,56,237,169,187,133,182,165,183,233,0,133,183,162,0,2370
3010 DATA142,167,187,173,168,187,73,255,24,109,163,187,201,8,144,8,2196
3020 DATA56,233,8,141,167,187,169,8,141,166,187,169,1,141,171,187,2132
3030 DATA160,0,140,165,187,173,169,187,73,255,24,109,162,187,201,20,2212
3040 DATA144,8,56,233,20,141,165,187,169,20,141,164,187,169,1,141,1946
3050 DATA170,187,173,164,187,201,20,208,5,169,0,141,170,187,173,165,2320
3060 DATA187,205,162,187,208,3,238,170,187,173,170,187,208,3,238,165,2691
3070 DATA187,173,166,187,201,8,208,5,169,0,141,171,187,173,167,187,2330
3080 DATA205,163,187,208,3,238,171,187,173,171,187,13,170,187,240,5,2508
3090 DATA169,32,76,36,185,177,182,145,250,200,238,164,187,192,40,144,2417
3100 DATA177,165,182,24,109,162,187,133,182,165,183,105,0,133,183,32,2122
3110 DATA58,183,173,171,187,208,3,238,167,187,238,166,187,232,224,15,2637
3120 DATA176,3,76,189,184,96,32,63,181,169,184,141,6,208,169,194,2071
3130 DATA141,7,208,169,0,141,0,208,141,1,208,141,16,208,141,13,1743
3140 DATA189,32,61,184,32,47,195,32,228,255,141,167,180,32,57,196,2028
3150 DATA173,167,180,32,51,196,173,167,180,238,42,208,201,0,240,231,2479
3160 DATA32,162,185,32,245,182,32,130,179,173,127,182,24,105,48,141,1979
3170 DATA12,4,76,83,185,72,173,114,181,240,3,32,228,186,104,201,1894
3180 DATA95,208,86,173,44,195,240,10,201,1,240,20,169,0,141,44,1867
3190 DATA195,96,169,1,141,44,195,169,0,141,45,195,141,46,195,96,1869
3200 DATA32,61,184,238,44,195,169,221,133,250,169,6,133,251,169,0,2255
3210 DATA141,131,195,174,45,195,142,132,195,173,46,195,73,7,168,177,2189
3220 DATA250,174,131,195,238,131,195,157,133,195,200,192,8,144,240,32,2615
3230 DATA117,195,174,132,195,202,16,222,96,201,145,208,32,173,44,195,2347
3240 DATA201,1,208,8,173,45,195,240,19,206,45,195,238,168,187,173,2302
3250 DATA168,187,205,163,187,144,5,169,0,141,168,187,96,201,157,208,2386
3260 DATA32,173,44,195,201,1,208,8,173,46,195,240,19,206,46,195,1982
3270 DATA238,169,187,173,169,187,205,162,187,144,5,169,0,141,169,187,2492
3280 DATA96,201,29,208,37,173,44,195,201,1,208,10,173,46,195,201,2018
3290 DATA7,240,237,238,46,195,206,169,187,173,169,187,201,255,208,9,2727
3300 DATA173,162,187,56,233,1,141,169,187,96,201,17,208,37,173,44,2085
3310 DATA195,201,1,208,10,173,45,195,201,7,240,237,238,45,195,206,2397
3320 DATA168,187,173,168,187,201,255,208,9,173,163,187,56,233,1,141,2510
3330 DATA168,187,96,201,74,208,16,104,104,169,0,141,7,208,173,89,1945
3340 DATA190,240,3,76,25,192,96,201,87,208,3,76,20,188,201,136,1942
3350 DATA208,3,76,91,190,201,43,208,4,238,158,180,96,201,45,208,2150
3360 DATA4,206,158,180,96,201,71,208,7,173,228,6,141,158,180,96,2113
3370 DATA201,42,240,3,76,120,187,173,160,187,133,250,173,161,187,133,2426
3380 DATA251,174,168,187,236,163,187,240,18,165,250,24,109,162,187,133,2654
3390 DATA250,165,251,105,0,133,251,232,76,241,186,160,0,165,250,24,2489
3400 DATA237,169,187,133,250,165,251,233,0,133,251,173,44,195,201,2,2624
3410 DATA240,6,173,158,180,145,250,96,165,250,56,233,7,133,250,165,2507
3420 DATA251,233,0,133,251,169,0,141,131,195,174,45,195,142,132,195,2387
3430 DATA173,46,195,73,7,168,174,131,195,238,131,195,189,133,195,145,2388
3440 DATA250,200,192,8,144,240,165,250,56,237,162,187,133,250,165,251,2890
3450 DATA233,0,133,251,165,251,205,161,187,144,15,208,7,165,250,205,2580
3460 DATA160,187,144,6,174,132,195,202,16,195,96,201,3,208,3,76,1998
3470 DATA164,186,174,117,181,240,3,76,46,186,174,118,181,240,3,76,2165
3480 DATA82,186,174,115,181,240,3,76,10,186,174,116,181,240,3,76,2043
3490 DATA123,186,96,0,64,40,25,43,23,19,11,20,36,0,0,0,686
3500 DATA169,0,173,160,187,133,250,162,2,32,251,187,173,161,187,133,2360
3510 DATA250,162,0,32,251,187,173,160,187,133,250,173,161,187,133,251,2690
3520 DATA174,163,187,165,250,24,109,4,0,0,0,0,0,1,0,1,1078
5000 PRINT"(CLR)NEW":PRINT"(DOWN)(DOWN)LOAD"+CHR$(34)+"3IN1 LOADER4"+CHR$(34)+",8"
5010 REM CHANGE ,8 ABOVE TO ,1 FOR TAPE
5020 PRINT"(DOWN)(DOWN)(DOWN)(DOWN)RUN"
5030 POKE631,13:POKE632,13:POKE633,13:POKE198,3:PRINT"(HOME)"
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3 into 1 EDITOR

PROGRAM: 3IN1 LOADER4

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2000 FORL=0TO148:CX=0:FORD=0TO15:READA:CX=CX+A:POKE48083+L*16+D,A:NEXTD
2010 READA:IFA<>CXTHENPRINT"ERROR IN LINE";2040+(L*10):STOP
2020 NEXTL
2040 DATA109,162,187,133,250,165,251,105,0,133,251,201,160,144,5,169,2425
2050 DATA1,141,172,187,202,208,230,162,7,32,251,187,162,5,165,250,2362
2060 DATA133,180,165,251,133,181,133,250,165,250,74,74,74,74,168,185,2490
2070 DATA233,180,157,172,4,165,250,41,15,168,185,233,180,157,173,4,2317
2080 DATA96,169,0,141,21,208,32,14,189,32,237,176,32,17,179,120,1663
2090 DATA169,244,141,20,3,169,189,141,21,3,88,169,0,141,21,208,1727
2100 DATA141,13,189,169,0,133,250,169,4,133,251,173,226,189,133,252,2425
2110 DATA173,227,189,133,253,162,0,160,0,173,13,189,208,7,177,252,2316
2120 DATA204,228,189,144,3,173,30,185,145,250,200,192,40,144,234,32,2393
2130 DATA58,183,165,252,24,109,162,187,133,252,165,253,105,0,133,253,2434
2140 DATA232,236,229,189,144,5,169,1,141,13,189,224,25,144,200,32,2173
2150 DATA228,255,201,87,240,10,201,3,240,6,32,150,188,76,46,188,2151
2160 DATA76,14,189,201,17,208,29,173,229,189,201,26,144,21,173,226,2116
2170 DATA189,24,109,162,187,141,226,189,173,227,189,105,0,141,227,189,2478
2180 DATA206,229,189,96,201,145,208,30,173,229,189,205,163,187,240,243,2933
2190 DATA173,226,189,56,237,162,187,141,226,189,173,227,189,233,0,141,2749
2200 DATA227,189,238,229,189,96,201,29,208,19,173,228,189,201,41,144,2601
2210 DATA210,206,228,189,238,226,189,208,3,238,227,189,96,201,157,208,3013
2220 DATA251,173,228,189,205,162,187,240,186,238,228,189,206,226,189,173,3270
2230 DATA226,189,201,255,208,230,206,227,189,96,0,120,169,1,141,25,2483
2240 DATA208,141,26,208,169,128,141,20,3,169,182,141,21,3,169,27,1756
2250 DATA141,17,208,169,0,141,14,220,88,169,151,141,0,221,169,0,1849
2260 DATA141,16,208,170,157,64,3,157,128,3,157,192,3,232,224,64,1919
2270 DATA144,242,162,0,189,179,180,157,64,3,189,203,180,157,128,3,2180
2280 DATA232,224,24,144,239,169,15,141,21,208,169,180,141,2,208,169,2286
2290 DATA150,141,4,208,169,60,141,3,208,141,5,208,169,15,141,249,2012
2300 DATA7,141,250,7,173,162,180,141,134,2,169,147,32,210,255,32,2042
2310 DATA61,184,32,173,187,169,0,133,250,169,4,133,251,169,0,141,2056
2320 DATA178,180,141,168,180,169,160,141,151,4,141,231,4,141,55,5,2049
2330 DATA162,0,160,0,169,160,145,250,200,192,10,144,247,165,250,24,2278
2340 DATA105,40,133,250,165,251,105,0,133,251,232,224,10,144,227,32,2302
2350 DATA237,176,32,14,179,96,173,162,187,141,228,189,173,163,187,141,2478
2360 DATA229,189,173,160,187,141,226,189,173,161,187,141,227,189,96,0,2668
2370 DATA64,40,25,67,72,65,82,32,35,0,8,0,0,0,83,69,642
2380 DATA84,169,1,141,25,208,238,52,184,173,52,184,208,8,169,50,1946
2390 DATA141,18,208,76,49,234,201,1,208,60,173,55,184,141,22,208,1979
2400 DATA173,53,184,141,24,208,173,239,189,240,46,169,0.141,240,189,2409
2410 DATA173,229,189,56,237,239,189,72,173,240,189,233,0,141,240,189,2789
2420 DATA104,201,23,176,12,10,10,10,24,105,54,141,18,208,76,129,1301
2430 DATA234,173,240,189,240,3,76,226,182,76,232,182,173,166,180,141,2713
2440 DATA32,208,141,33,208,96,0,0,32,39,179,169,210,133,250,169,1899
2450 DATA4.133,251,162,0,160,0,169,160,145,250,165,251,24,105,212,2191
2460 DATA133,251,173,162,180,145,250,165,251,56,233,212,133,251,200,192,2987
2470 DATA14,144,228,32,58,183,232,224,16,144,218,32,244,190,32,228,2219
2480 DATA255,201,17,208,18,173,56,191,24,105,1,201,14,144,2,169,1779
2490 DATA0,141,56,191,76,142,190,201,145,208,18,173,56,191,56,233,2077
2500 DATA1,201,255,208,2,169,13,141,56,191,76,142,190.201,13,208,2067
2510 DATA37,173,56,191,10,170,189,205,191,141,214,190,189,206,191,141,2494
2520 DATA215,190,32,233,191,32,14,189,32,94,175,173,89,190,208,3,2060
2530 DATA76,61,184,76,25,192,201,3,240,235,201,136,240,231,76,142,2319
2540 DATA190,169,251,133,250,169,4,133,251,162,0,142,55,191,160,0,2260
2550 DATA189,57,191,232,201,255,240,43,201,0,240,28,41,63,72,173,2226
2560 DATA55,191,205,56,191,240,4,104,76,34,191,104,76,37,191,24,1779
2570 DATA105,128,145,250,200,76,3,191,32,58,183,238,55,191,160,0,2015
2580 DATA76,3,191,96,13,4,76,79,65,68,0,83,65,86,69,32,1006
2590 DATA67,72,65,82,83,0,83,65,86,69,32,87,73,78,68,79,1089
2600 DATA87,0,77,85,76,84.73,32,67,79,76,0,72,73,82,69,1032
2610 DATA83,0,86,73,69,87,32,67,72,65,82,83,0,70,69,84,1022
2620 DATA67,72,32,67,72,65,82,83,0,66,79,82,68,69,82,32,1018
2630 DATA67,72,65,82,0,70,73,76,76,32,87,73,78,68,79,97,1085
2640 DATA0,87,73,78,68,79,87,32,83,73,90,69,0,80,79,83,1061
2650 DATA73,84,73,79,78,32,50,78,68,0,68,69,86,73,67,69,1047
2660 DATA0,67,79,80,89,32,83,80,82,73,84,69,0,66,65,83,1032
2670 DATA69,32.65,68,68,82,69,83,83,255,119,192,139,192,162,193,1871
2680 DATA249,191,233,191,9,192,59,192,202,192,106,193,27,193,85,193,2507
2690 DATA18,193,203,193,221,192,169,0,141,161,180,173,164,180,41,7,2236
2700 DATA141,164,180,76,237,176,169,1,141,161,180,173,178,180,41,254,2452
2710 DATA141,178,180,76,237,176,173,89,190,240,11,169,0,141,7,208.2216
2720 DATA141,89,190,76,61,184,162,0.173,30,185,157,144,5,157,88,1842
2730 DATA6,157,32,7,232,224,200,144,239,162,0,138,157,224,5,232,2159
2740 DATA208,249,169,1,141,89,190,96,169.6,141,28,4,32,25,180,1728
2750 DATA174,13,189,208,242,174,236,189,134,250,174,237,189,134,251,162,2956
2760 DATA0,134,252,133,253,120,169,49,133,1,162.0,160,0,177,252,1995
2770 DATA145,250,200,208,249,232,230,253,230,251,224,8,144,238,169,54,3085
2780 DATA133,1,88,96,169,12,141,27,4,32,120,181,173,13,189,208,1587
2790 DATA6,32,39,179,32,67,182,96,169,19,141,27,4,32,120,181,1326
2800 DATA169,19,32,231,178,173,13,189,208,44,165,252,141,169,180,165,2328
2810 DATA253.141,170,180.169
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,5,32,231,178,165,252,24,105
,8,133,252,2298
2820 DATA165,253,105,0,133,2
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2830 DATA32,39,179,32,9,182,
96,169,2,32,231,178,173,13,1
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2840 DATA245,173,146,180,141
,30,185,76,61,184,169,2,141,
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2850 DATA8,141,28,4,32,25,18
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2860 DATA172,187,208,19,141,
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2870 DATA4,32,25,180,141,160
,187,169,32,141,27,4,76,201,
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2880 DATA127,182,73,9,141,12
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2940 DATA45,32,173,187,173,1
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2950 DATA173,146,180,145,250
,165,250,24,105,1,133,250,16
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2960 DATA133,251,165,250,197
,180,208,230,165,251,197,181
,208,224,96,169,3105
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2990 DATA181,32,39,179,32,9,
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3000 DATA174,13,189,208,242,
141,255,7,169,128,141,21,208
,141,27,208,2272
3010 DATA169,58,141,15,208,1
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32,130,179,1983
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3030 DATA17,208,6,32,158,194
,76,237,193,201,29,208,6,32,
142,194,1933
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3050 DATA6,32,126,194,76,237
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08,6,1801
3060 DATA32,174,194,76,237,1
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3070 DATA201,43,208,3,238,15
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3080 DATA64,4,96,32,95,194,1
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,10,1428
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3100 DATA1,201,255,208,2,169
,2,141,43,195,96,173,42,195,
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,2,141,42,195,96,173,42,195,
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,105,1598
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16,249,2122
3150 DATA165,251,24,105,0,13
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3180 DATA0,145,252,136,16,24
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3200 DATA200,192,8,144,227,9
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3210 DATA40,41,42,0,80,81,82
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3220 DATA1,96,169,221,133,25
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3230 DATA45,195,142,132,195,
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,203,193,2265
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,80,208,2277
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3360 DATA221,192,201,66,208,
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3430 DATA208,169,54,133,1,16
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3440 DATA255,141,138,2,169,1
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7,0,216,2056
3450 DATA157,250,216,157,244
,217,157,238,218,232,224,250
,144,239,160,0,3103
3460 DATA152,72,185,87,199,2
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3470 DATA104,173,177,198,24,
105,48,141,241,5,141,18,6,32
,228,255,1896
3480 DATA201,0,240,249,141,0
,4,32,229,196,169,0,141,190,
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3490 DATA124,196,201,49,208,
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2,240,1806
3500 DATA174,96,201,51,208,6
9,169,52,133,250,169,200,133
,251,160,0,2316
3510 DATA177,250,240,45,201,
1,240,50,201,44,208,7,72,169
,30,32,1967
3520 DATA210,255,104,201,13,
208,7,4,0,0,0,0,0,1,0,1,1004
5000 PRINT"(CLR)NEW":PRINT"(
DOWN)(DOWN)LOAD"+CHR$(34)+"3
IN1 LOADER5"+CHR$(34)+",8"
5010 REM CHANGE ,8 ABOVE TO
,1 FOR TAPE
5020 PRINT"(DOWN)(DOWN)(DOWN
)(DOWN)RUN"
5030 POKE631,13:POKE632,13:P
OKE633,13:POKE198,3:PRINT"(H
OME)"
```

3 into 1

EDITOR

PROGRAM: 3IN1 LOADERS

3 into 1 EDITOR

```
2000 FORL=0TO148:CX=0:FORD=0TO15:READA:CX=CX+A:POKE50457+L*16+D,A:NEXTD
2010 READA:IFA<>CXTHENPRINT"ERROR IN LINE";2040+(L*10):STOP
2020 NEXTL
2040 DATA7,72,169,5,32,210,255,104,32,210,255,165,250,24,105,1,1896
2050 DATA133,250,165,251,105,0,133,251,76,1,197,32,228,255,201,32,2310
2060 DATA208,249,240,231,96,201,52,208,11,169,57,133,250,169,202,133,2609
2070 DATA251,76,1,197,201,53,208,32,32,204,198,173,190,205,208,228,2457
2080 DATA173,55,199,162,56,160,199,32,189,255,169,15,168,162,8,32,2034
2090 DATA186,255,32,192,255,76,117,197,201,55,208,65,169,13,32,210,2263
2100 DATA255,32,210,255,169,0,32,189,255,169,15,168,162,8,32,186,2137
2110 DATA255,32,192,255,162,15,32,198,255,32,207,255,32,210,255,201,2588
2120 DATA13,208,241,162,0,32,198,255,169,15,32,195,255,169,13,32,1989
2130 DATA195,255,169,28,133,250,169,202,133,251,76,36,197,201,54,208,2557
2140 DATA72,32,178,198,169,13,32,210,255,169,1,162,175,160,198,32,2056
2150 DATA189,255,169,13,160,13,162,8,32,186,255,32,192,255,162,13,2096
2160 DATA32,198,255,32,207,255,201,130,208,22,169,13,32,210,255,160,2379
2170 DATA14,32,207,255,32,207,255,32,207,255,32,210,255,136,16,247,2392
2180 DATA165,144,201,64,144,221,76,156,197,201,56,208,53,32,204,198,2320
2190 DATA173,190,205,208,44,169,13,32,210,255,173,55,199,162,56,160,2304
2200 DATA199,32,189,255,169,13,152,174,177,198,32,186,255,169,1,133,2334
2210 DATA252,169,160,133,253,162,90,160,206,169,252,32,216,255,76,156,2741
2220 DATA197,96,201,57,208,9,169,0,141,87,206,141,88,206,169,13,2078
2230 DATA141,89,206,32,204,198,173,190,205,208,230,160,0,185,191,205,2617
2240 DATA240,7,32,210,255,200,76,86,198,32,228,255,201,78,240,12,2350
2250 DATA201,89,208,245,32,207,205,169,0,141,89,206,173,190,205,208,2568
2260 DATA192,169,13,32,210,255,173,55,199,162,56,160,199,32,189,255,2351
2270 DATA169,13,172,89,206,174,177,198,32,186,255,169,0,174,87,206,2307
2280 DATA172,88,206,32,213,255,76,156,197,201,133,208,8,173,177,198,2493
2290 DATA73,9,141,177,198,96,36,35,8,169,1,162,175,160,198,32,1670
2300 DATA189,255,169,13,160,13,162,8,32,186,255,32,192,255,169,13,2103
2310 DATA76,195,255,160,0,169,45,141,172,6,169,62,141,173,6,140,1910
2320 DATA54,199,185,174,6,73,128,153,174,6,32,228,255,172,54,199,2092
2330 DATA201,3,208,8,169,1,141,190,205,76,28,199,201,20,240,48,1938
2340 DATA201,13,240,24,201,32,144,215,201,97,176,211,192,26,240,207,2420
2350 DATA153,56,199,41,63,153,174,6,200,76,216,198,192,0,240,191,2158
2360 DATA140,55,199,169,32,162,0,157,171,6,232,224,30,144,248,96,2065
2370 DATA192,0,240,171,169,32,153,174,6,136,76,216,198,16,16,84,1979
2380 DATA72,69,32,69,68,73,84,79,82,32,53,48,51,48,48,48,956
2390 DATA48,234,234,234,234,234,234,234,234,234,234,234,234,234,159,32,3281
2400 DATA32,83,80,82,73,84,69,47,67,72,65,82,47,83,67,82,1115
2410 DATA69,69,78,32,69,68,73,84,79,82,32,86,50,46,50,13,980
2420 DATA13,32,32,32,32,87,82,73,84,84,69,78,32,66,89,32,917
2430 DATA65,46,67,82,79,87,84,72,69,82,13,13,13,32,32,32,868
2440 DATA49,41,32,83,80,82,73,84,69,32,69,68,73,84,79,82,1080
2450 DATA13,32,32,32,50,41,32,67,72,65,82,47,83,67,82,69,866
2460 DATA69,78,32,69,68,73,84,79,82,13,32,32,32,51,41,32,867
2470 DATA72,69,76,80,32,83,80,82,73,84,69,83,13,32,32,32,992
2480 DATA52,41,32,72,69,76,80,32,67,72,65,82,83,13,32,32,900
2490 DATA32,53,41,32,68,73,83,75,32,67,79,77,77,65,78,68,1000
2500 DATA83,13,32,32,32,54,41,32,68,73,82,13,32,32,32,55,706
2510 DATA41,32,68,73,83,75,32,82,69,80,79,82,84,13,32,32,957
2520 DATA32,56,41,32,83,65,86,69,32,69,68,73,84,79,82,13,964
2530 DATA32,32,32,57,41,32,76,79,65,68,0,147,83,80,82,73,979
2540 DATA84,69,32,69,68,73,84,79,82,32,73,78,70,79,13,13,998
2550 DATA67,82,83,82,47,74,79,89,44,67,82,83,82,32,77,79,1149
2560 DATA86,69,77,69,78,84,13,42,47,70,73,82,69,49,44,68,1020
2570 DATA82,65,87,32,80,73,88,69,76,13,83,80,65,67,69,47,1076
2580 DATA70,73,82,69,48,44,68,69,76,69,84,69,32,80,73,88,1094
2590 DATA69,76,13,13,88,44,88,70,76,73,80,13,89,44,89,70,995
2600 DATA76,73,80,13,13,71,44,71,79,84,79,32,83,80,82,73,1033
2610 DATA84,69,32,78,85,77,66,69,82,32,63,13,67,44,67,79,1007
2620 DATA80,89,32,83,80,82,73,84,69,32,78,85,77,66,69,82,1161
2630 DATA32,63,13,13,70,49,44,74,79,89,83,84,73,67,75,70,978
2640 DATA73,82,69,32,40,48,41,68,69,76,32,40,49,41,68,82,910
2650 DATA65,87,13,13,43,44,73,78,67,82,69,65,83,69,32,83,966
2660 DATA80,82,73,84,69,32,78,85,77,66,69,82,13,45,44,68,1047
2670 DATA69,67,82,69,65,83,69,32,83,80,82,73,84,69,32,78,1117
2680 DATA85,77,66,69,82,13,13,13,28,80,82,69,83,83,32,83,958
2690 DATA80,65,67,69,32,84,79,32,67,79,78,84,73,78,85,69,1121
2700 DATA0,147,13,49,45,51,44,67,79,76,79,85,82,83,32,49,981
2710 DATA45,51,13,83,72,73,70,84,32,49,45,53,44,67,72,65,918
2720 DATA78,71,69,32,67,79,76,79,85,82,83,13,13,67,84,82,1060
2730 DATA76,32,82,44,73,78,86,69,82,83,69,32,83,80,82,73,1124
2740 DATA84,69,13,13,85,44,83,67,82,79,76,76,32,83,80,82,1048
2750 DATA73,84,69,32,85,80,13,68,44,68,79,87,78,13,76,44,993
2760 DATA76,69,70,84,13,82,44,82,73,71,72,84,13,13,68,69,983
2770 DATA76,44,83,67,82,79,76,76,32,82,79,87,32,76,69,70,1110
2780 DATA84,13,83,72,73,70,84,32,68,69,76,44,83,67,82,79
```

```
,1079
2790 DATA76,76,32,82,79,87,3
2,82,73,71,72,84,13,13,83,72
,1027
2800 DATA73,70,84,32,72,79,7
7,69,44,67,76,69,65,82,32,83
,1074
2810 DATA80,82,73,84,69,13,1
3,82,85,78,47,83,84,79,80,44
,1076
2820 DATA71,79,84,79,32,77,6
5,73,78,32,77,69,78,85,13,13
,1005
2830 DATA70,55,44,68,82,79,8
0,32,68,79,87,78,32,87,73,78
,1092
2840 DATA68,79,87,13,13,13,2
8,80,82,69,83,83,32,83,80,65
,958
2850 DATA67,69,32,84,79,32,6
7,79,78,84,73,78,85,69,0,1,9
77
2860 DATA147,67,72,65,82,47,
83,67,82,69,69,78,32,69,68,7
3,1170
2870 DATA84,79,82,32,73,78,7
0,79,13,13,67,82,83,82,47,74
,1038
2880 DATA79,89,44,67,82,83,8
2,32,77,79,86,69,77,69,78,84
,1177
2890 DATA13,42,47,70,73,82,6
9,49,44,68,82,65,87,32,80,73
,976
2900 DATA88,69,76,13,83,80,6
5,67,69,47,70,73,82,69,48,44
,1043
2910 DATA68,69,76,69,84,69,3
2,80,73,88,69,76,13,13,88,44
,1011
2920 DATA88,70,76,73,80,13,8
9,44,89,70,76,73,80,13,13,71
,1018
2930 DATA44,71,79,84,79,32,6
7,72,65,82,32,78,85,77,66,69
,1082
2940 DATA82,32,63,13,67,44,6
7,79,80,89,32,67,72,65,82,32
,966
2950 DATA78,85,77,66,69,82,3
2,63,13,13,70,49,44,74,79,89
,983
2960 DATA83,84,73,67,75,70,7
3,82,69,32,40,48,41,68,69,76
,1050
2970 DATA32,40,49,41,68,82,6
5,87,13,13,43,44,73,78,67,82
,877
2980 DATA69,65,83,69,32,67,7
2,65,82,32,78,85,77,66,69,82
,1093
2990 DATA13,45,44,68,69,67,8
2,69,65,83,69,32,67,72,65,82
,992
3000 DATA32,78,85,77,66,69,8
2,13,13,83,44,67,72,65,78,71
,995
3010 DATA69,32,67,72,65,82,3
2,83,69,84,32,40,49,41,36,48
,901
3020 DATA56,48,48,32,40,50,4
1,36,50,48,48,48,13,13,28,80
,679
3030 DATA82,69,83,83,32,83,8
0,65,67,69,32,84,79,32,67,79
,1086
3040 DATA78,84,73,78,85,69,0
,147,13,49,45,51,44,67,79,76
,1038
3050 DATA79,85,82,83,32,49,4
5,51,13,83,72,73,70,84,32,49
,982
3060 DATA45,53,44,67,72,65,7
8,71,69,32,67,79,76,79,85,82
,1064
3070 DATA83,13,13,67,84,82,7
6,32,82,44,73,78,86,69,82,83
,1047
3080 DATA69,32,67,72,65,82,1
3,13,85,44,83,67,82,79,76,76
,1005
3090 DATA32,67,72,65,82,32,3
2,85,80,13,68,44,68,79,87,78
,984
3100 DATA13,76,44,76,69,70,8
4,13,82,44,82,73,71,72,84,13
,966
3110 DATA13,70,49,44,68,82,7
9,80,32,68,79,87,78,32,87,73
,1021
3120 DATA78,68,79,87,13,13,1
3,28,80,82,69,83,83,32,83,80
,971
3130 DATA65,67,69,32,84,79,3
2,67,79,78,84,73,78,85,69,0,
1041
3140 DATA147,13,67,72,65,82,
32,70,69,84,67,72,44,32,68,4
8,1032
3150 DATA61,82,79,77,32,48,5
6,61,83,69,84,49,32,50,48,61
,972
3160 DATA83,69,84,50,13,13,8
3,72,73,70,84,32,72,79,77,69
,1023
3170 DATA44,67,76,69,65,82,3
2,67,72,65,82,13,13,82,85,78
,992
3180 DATA47,83,84,79,80,44,7
1,79,84,79,32,77,65,73,78,32
,1087
3190 DATA77,69,78,85,13,13,7
4,44,74,85,77,80,32,84,79,32
,996
3200 DATA87,73,78,68,79,87,1
3,13,32,32,67,82,83,82,47,74
,997
3210 DATA79,89,44,77,79,86,6
9,32,67,82,83,82,13,13,32,32
,959
3220 DATA42,47,70,73,82,69,4
4,80,85,84,32,67,72,65,82,13
,1007
3230 DATA32,32,71,44,71,69,8
4,32,67,72,65,82,13,13,32,32
,811
3240 DATA43,44,73,78,67,82,6
9,65,83,69,32,67,72,65,82,32
,1023
3250 DATA78,85,77,66,69,82,1
3,32,32,45,44,68,69,67,82,69
,978
3260 DATA65,83,69,32,67,72,6
5,82,32,78,85,77,66,69,82,13
,1037
3270 DATA13,28,80,82,69,83,8
3,32,83,80,65,67,69,32,84,79
,1029
3280 DATA32,67,79,78,84,73,7
8,85,69,0,147,13,13,32,32,74
,956
3290 DATA44,74,85,77,80,32,8
4,79,32,67,72,65,82,32,69,68
,1042
3300 DATA73,84,79,82,13,13,3
2,32,87,44,68,73,83,80,76,65
,984
3310 DATA89,32,70,85,76,76,3
2,83,67,82,69,69,78,32,87,73
,1100
3320 DATA78,68,79,87,13,13,3
2,32,32,32,67,82,83,82,44
,856
3330 DATA77,79,86,69,32,65,8
2,79,85,78,68,13,13,32,32,32
,922
3340 DATA32,32,87,44,69,88,7
3,84,13,13,95,44,67,79,80,89
,989
3350 DATA32,66,76,79,67,75,8
3,32,79,70,32,84,72,69,32,87
,1035
3360 DATA73,78,68,79,87,13,1
3,32,32,32,73,41,44,83,69,84
,901
3370 DATA32,67,85,82,83,69,8
2,32,80,79,83,46,13,13,32,32
,910
3380 DATA73,73,41,44,83,69,8
4,32,87,73,78,68,79,87,32,83
,1086
3390 DATA73,90,69,13,13,32,3
2,73,73,73,41,44,70,79,82,71
,928
3400 DATA69,84,32,66,76,79,6
7,75,13,13,13,28,80,82,69,83
,929
3410 DATA83,32,83,80,65,67,6
9,32,84,79,32,67,79,78,84,73
,1087
3420 DATA78,85,69,0,1,0,13,1
3,79,70,70,83,69,84,32,40,78
6
3430 DATA89,47,78,41,63,0,16
0,0,169,31,153,174,6,140,54,
199,1404
3440 DATA32,228,255,172,54,1
99,201,0,240,238,201,13,240,
43,201,20,2337
3450 DATA240,84,201,3,240,93
,201,48,144,222,201,71,176,2
18,201,58,2401
3460 DATA144,7,201,65,176,3,
76,209,205,153,82,206,41,63,
153,174,1958
3470 DATA6,192,4,240,195,200
,76,209,205,192,3,144,54,169
,0,160,2049
3480 DATA0,162,3,14,87,206,4
6,88,206,202,16,247,185,82,2
06,56,1806
3490 DATA233,48,201,10,144,3
,56,233,7,24,109,87,206,141,
87,206,1795
3500 DATA200,192,4,144,220,9
6,192,0,240,142,169,32,153,1
74,6,136,2100
3510 DATA76,209,205,169,1,14
1,190,205,96,0,0,0,0,0,0,0,1
292
3520 DATA13,0,0,0,0,0,7,4,0,
0,0,0,0,1,0,1,26
5000 PRINT"(CLR)(DOWN)(DOWN)
 READY TO START 3IN1 EDITOR"
5010 PRINT"(DOWN)(DOWN)USE O
PTION 6 IN PROGRAM TO MAKE A
"
5020 PRINT"COPY OF THE PROGR
AM ON DISK OR TAPE."
5030 PRINT"(DOWN)(DOWN)PRESS
 F1 TO CHANGE OUTPUT FROM DI
SK (8) TO TAPE (1)"
5040 PRINT"(DOWN)(DOWN)(DOWN
) ANY KEY TO START PROGRAM"
5050 GET K$:IFK$=""THEN 5050
5060 SYS 50300
```

DIMON 128

An impish 128 utility

by M E Catley.

DIMON 128 IS A DISK utility program for the C128 Computer for use with a CBM 1541 or CBM 1571 disk drive.

Carefully type in the program, which MUST be saved before running as it will over-write itself. It is fully error trapped, and on completion will ask for a filename. This is the name under which the machine code will be saved and subsequently loaded as a Basic program.

When run, you will see a menu/help page giving all the commands and their syntax. This page can be re-called at any time by pressing "M". All commands need to be followed by pressing the return key.

A word of warning. Some of the commands incorporated into the disk monitor write directly on to disk track/sectors. It is always worth making a back-up copy of the disk before starting, as any error could prove catastrophic.

Commands

M – Re-display the main menu/help page.

R XX XX – READ a track/sector directly off the disk into a buffer in the computer. This command will enable any track/sector of the disk to be read into the buffer where it can be viewed, altered or prepared for storing back on the disk.

W XX XX – WRITE a track/sector from the computer buffer directly on to the disk. This command enables data in the buffer, be it typed in from the keyboard or read off the disk and modified, to be recorded on to the specified track/sector of the disk.

M XX XX – Display memory from the buffer. One sector of data consists of 256 bytes. This command will enable all or any of these bytes to be displayed on the screen. The first hex number is the first byte to be displayed, whilst the second is the final byte. Due to the size of the screen in 40 column mode, not all 255 bytes can be simultaneously displayed. The display will show the hex contents of the buffer and the ASCII contents providing these are printable, i.e. ASCII codes between 32 and 127 are printed, others being replaced with a period.

MT – This is a variant of the memory command and is a short hand method of displaying a screenful of memory starting at the top of memory ($00) down to ($B0).

MB – This is similar to the MT command, but displays the bottom of the buffer from ($50) to ($FF).

; – The semi-colon command enables on-screen editing of the buffer. When the memory display commands are used, the buffer contents are displayed on the screen preceded by a semi-colon. This enables on-screen editing to take place, so that when the cursor is placed over a byte and the byte is modified, the buffer contents are also modified ready for saving back to disk.

@ – This is the command that reads the disk error channel and displays it on the screen. Any time the error light flashes on the disk drive, pressing "@" will clear the error indication and display the error number, error type, error track and error sector.

+ – When a track/sector has been read into the computer buffer, the first two bytes contain the track and sector respectively of the next block of the file. If this is the last block in the file, the track value is zero. This command will read the track and sector values of the next block and load that block into the buffer, displaying which track and sector is involved. A track value of zero indicates the last block of the file has been loaded.

D – This command will read the disk directory, displaying the track and sector of the first block of the file, the length of the file, the filename, and the file type. It will display

all file types, including deleted files which facilitates the recovery of files that have been inadvertantly scratched, providing that no writing has been done to the disk since the erasure. The directory is displayed in blocks of up to 16 files, and finishes with the number of blocks free, as always in hex.

T – TRACE will, as its name suggests, trace a file on a disk and display the sequence of track/sectors in the order in which it was saved. The requested filename must be correct, and no wildcards are allowed.

X – EXIT to Basic.

L – LOCK or write protect the disk. This command will render the disk write protected without the use of a write protect tab (which always falls off). Any attempt to save a file on a disk so protected, results in error 73, DOS TYPE error message.

U – UNLOCK or write enable the disk. This command is the opposite of the LOCK command and renders the disk write enabled, overcoming the software protection afforded by LOCK.

J – On the CBM 1571 and CBM 1541 disk drives, when the file type byte in the disk directory has bit six set, the file cannot be scratched by the BASIC 7 command

SCRATCH or by BASIC 2's OPEN15,8,15, "S0:filename":close15. This condition is indicated in a directory listing by a "<" character next to the filename. The J command sets bit six of all the files in the directory and so renders them individually protected against erasure.

K – The K command is the opposite of the J command, and resets bit six of all the files in the disk directory enabling erasure from the directory by conventional means.

A – The A command is similar to the J command, but only operates on one named file in the directory. Again, the filename must be correct and no wildcards are allowed.

B – The B command is once more the opposite of the A command and will enable one named file to be un-protected in the directory. ■

Used with care, the disk monitor can be of considerable assistance in the management of a disk library. However, careless use can have disastrous results, so always ensure you have a back-up of your disk.

Happy disk monitoring!

PROGRAM PROGRAM: DIMON 128 LOAD

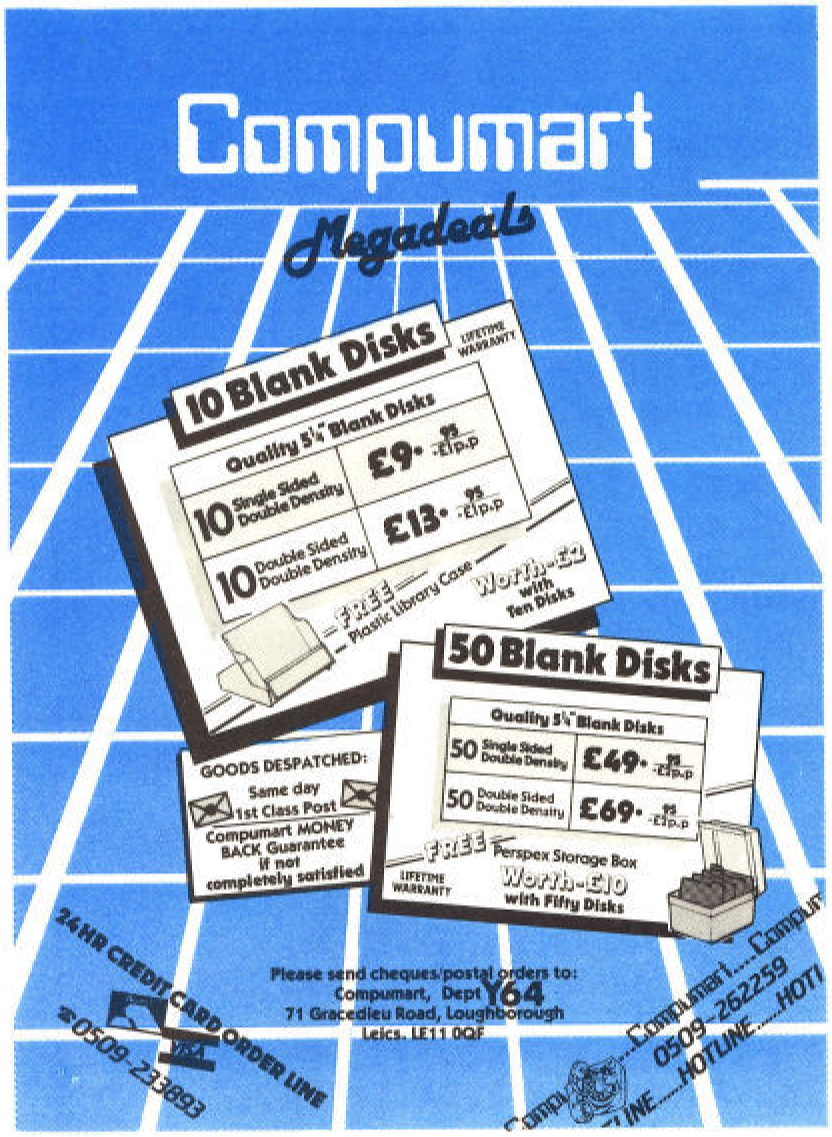
```
10 DATA 1C01
20 DATA 0B,1C,0A.00,9E,37,31,38,31,0
0,00,00,A0,00,8C,20,D0,8C,21,D0,0539
30 DATA 20,7D,FF,93,96,12,20,20,20,2
0.20,20,20,20,20,20,20,20,20,20,0497
40 DATA 20,44,45,4D,4F,4E,20,20,31,3
2,38,20,20,20,20,20,20,20,20,20,038E
50 DATA 20,20,20,20,20,20,28,43,29,2
0,31,39,38,36,20,20,4D,2E,20,43,036A
60 DATA 41,54,4C.45,59,20,20,52,49,4
3,48,4D,4F,4E,44,20,20,4E,2E,20,04EF
70 DATA 59,4F,52,4B,53,20,9E,00,A9,1
8,85,E4,A9,02,85,E5,A9,00,85,E6,08A9
80 DATA A9.27,85,E7,20,7D,FF,93,0D,2
0,20,20,99,12,43,4F,4D,4D,41,4E,073E
90 DATA 44,20,53,55,4D,4D,41,52,59.2
0.20,28,58,58,20,3D,20,48,45,58,050C
100 DATA 20,4E.55,4D,42,45,52,29,92,
0D,0D,9E,4D.20,20,20,20,20,20,20,048
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110 DATA 20,52,45.2D,44.49,53.50,4C,
41,59,20,54,48,49,53,20,4D,45,4E,055
2
120 DATA 55,0D,52,20,58,58,20,58,58,
20,20,52,45,41,44,20,53,45,43,54,04F
F
130 DATA 4F.52.20.20,28,54,52,41,43.
4B,20,41,4E,44,20,53,45,43,54,4F,050
F
140 DATA 52.29,57,20,58,58,20,58,58,
20,20,57,52,49,54,45,20,53,45,43,053
8
150 DATA 54,4F.52,20,28,54,52,41,43.
4B,20,41,4E,44,20,53,45,43,54,4F,054
3
160 DATA 52.29,4D,20,58,58,20,58,58,
20,20,44,49,53,50,4C,41,59,20,42,052
0
170 DATA 55,46,46,45.52,20.28,53,54,
41,52,54,20,41,4E,44,20,45,4E,44,053
8
180 DATA 29.20,4D,54,20,20,20,20,20,
20,20,44,49,53,50,4C,41,59,20,42,044
2
190 DATA 55,46,46,45.52.20,28,24.30,
30,20,54,4F,20,24,41,46,29,0D,4D,045
5
200 DATA 42,20.20,20,20,20,20,20,44,
49,53,50,4C,41,59,20,42,55,46,46,047
B
210 DATA 45.52,20,28,24,35,30,20,54,
4F,20,24,46,46,29,0D,2B,20,20,20,03B
C
220 DATA 20.20,20.20,20,4E,45,58,54.
20.53,45,43,54,4F,52,20,49,4E,20,04A
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D
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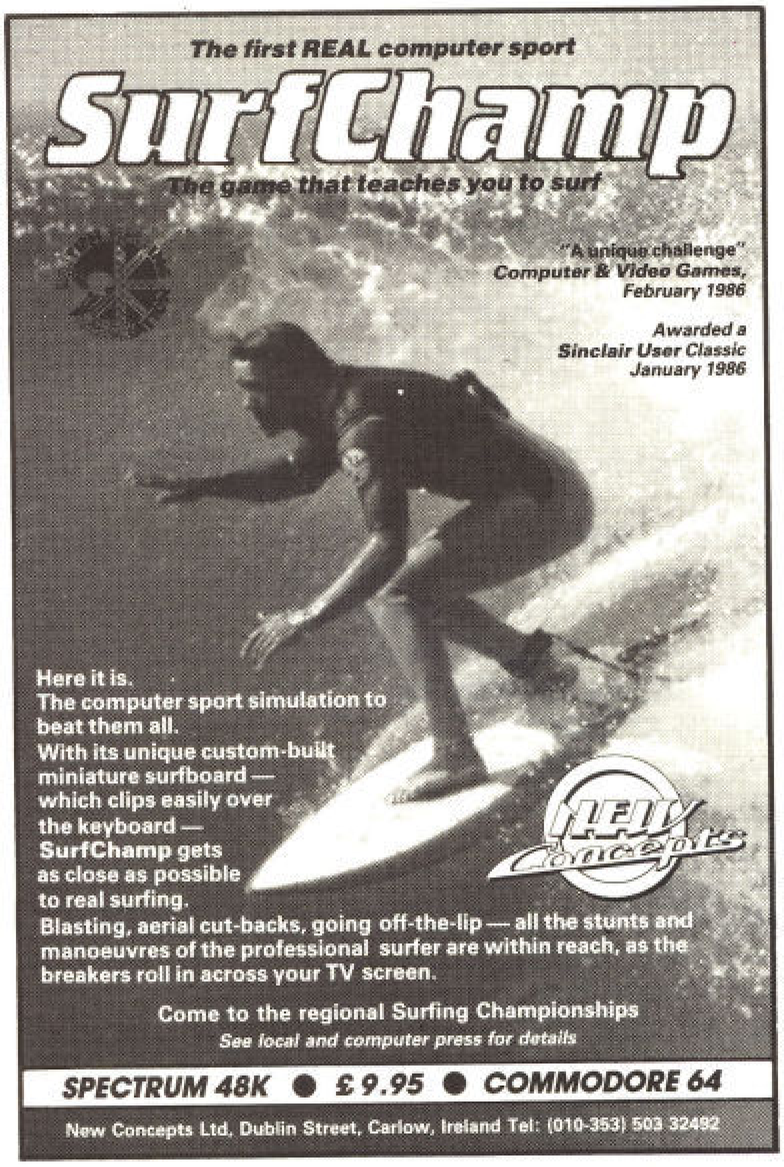
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250 DATA 20,20,20,20,20,20,20,50,52,
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260 DATA 52,59,0D,54,20,20,20,20,20,
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270 DATA 4F,47,52,41,4D,0D,58,20,20,
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280 DATA 54,4F,20,42,41,53,49,43,0D,
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290 DATA 49,54,45,20,50,52,4F,54,45,
43,54,20,44,49,53,4B,0D,55,20,20,051
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300 DATA 20,20,20,20,20,20,57,52,49,
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310 DATA 49,53,4B,0D,4A,20,20,20,20,
20,20,20,20,4C,4F,43,4B,20,41,4C,041
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320 DATA 4C,20,46,49,4C,45,53,0D,4B,
20,20,20,20,20,20,20,20,55,4E,4C,042
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330 DATA 4F,43,4B,20,41,4C,4C,20,46,
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340 DATA 20,20,20,4C,4F,43,4B,20,41,
20,46,49,4C,45,0D,42,20,20,20,20,03F
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350 DATA 20,20,20,20,55,4E,4C,4F,43,
4B,20,41,20,46,49,4C,45,0D,3B,20,045
5
360 DATA 20,20,20,20,20,20,20,53,43,
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370 DATA 20,42,55,46,46,45,52,0D,00,
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380 DATA 00,8D,01,02,20,DD,20,C9,2A,
F0,F9,C9,20,F0,F5,AE,80,29,CA,DD,0A5
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390 DATA 81,29,D0,0F,8E,00,02,8A,0A,
AA,BD,91,29,48,BD,90,29,48,60,CA,07F
E
400 DATA 10,E9,4C,C9,1E,A9,00,8D,02,
02,20,DD,20,C9,20,D0,09,20,DD,20,076
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410 DATA C9,20,D0,0F,18,60,20,28,1F,
0A,0A,0A,0A,8D,02,02,20,DD,20,20,049
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420 DATA 28,1F,0D,02,02,38,60,C9,3A,
08,29,0F,28,90,02,69,08,60,20,DD,04B
B
430 DATA 20,20,FE,1E,90,1D,8D,A9,0B,
20,DD,20,20,FE,1E,90,12,8D,AA,0B,078
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440 DATA 60,20,33,1F,20,7C,20,A9,31,
20,85,25,20,A4,20,4C,C9,1E,20,33,059
C
450 DATA 1F,20,7C,20,20,6B,25,A9,32,
20,4C,20,20,A4,20,4C,C9,1E,85,97,062
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460 DATA 20,EC,20,B9,00,0C,20,BB,20,
C8,D0,03,EE,01,02,C6,97,D0,ED,60,08F
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470 DATA AD,01,02,D0,06,CC,04,02,B0,
01,60,68,68,4C,C9,1E,20,E9,20,A9,073
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480 DATA 3B,A2,2A,4C,CA,20,98,38,E9,
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490 DATA B9,00,0C,29,7F,C9,20,B0,02,
A9,2E,20,D2,FF,A9,00,85,F4,C8,CA,098
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500 DATA D0,EA,A9,92,4C,D2,FF,4C,7D,
1C,A0,00,8C,03,02,88,8C,04,02,20,086
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510 DATA CF,FF,C9,54,D0,08,A0,B0,8C,
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520 DATA 8C,03,02,4C,0A,20,C9,0D,F0,
D5,20,FE,1E,90,12,8D,03,02,20,CF,070
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530 DATA FF,C9,0D,F0,08,20,FE,1E,90,
03,8D,04,02,AC,03,02,20,85,1F,20,06C
4
540 DATA 95,1F,98,20,BB,20,20,EC,20,
A9,08,20,6F,1F,20,9F,1F,4C,0D,20,062
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550 DATA 20,FE,1E,90,03,99,00,0C,C8,
C6,97,60,20,FE,1E,90,13,A8,A9,08,083
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560 DATA 85,97,20,DD,20,20,DD,20,20,
25,20,D0,F8,20,9F,1F,4C,C9,1E,8D,082
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570 DATA 74,29,AD,A9,0B,20,AE,20,8E,
7B,29,8D,7C,29,AD,AA,0B,20,AE,20,07A
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580 DATA 8E,7E,29,8D,7F,29,A2,0F,20,
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590 DATA E0,0D,D0,F5,4C,CC,FF,A9,0F,
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600 DATA 29,20,BD,FF,20,C0,FF,A9,0D,
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610 DATA 29,20,BD,FF,4C,C0,FF,A9,0D,
20,C3,FF,A9,0F,4C,C3,FF,A2,30,38,0A7
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620 DATA E9,0A,90,03,E8,B0,F9,69,3A,
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630 DATA 29,0F,20,D3,20,48,8A,20,D2,
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650 DATA 20,4C,D2,FF,A0,03,B9,1B,29,
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A
660 DATA 8D,A9,0B,48,20,BB,20,68,F0,
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670 DATA C8,D0,F5,AD,01,0C,8D,AA,0B,
20,BB,20,4C,4D,1F,20,7C,20,A2,0F,07A
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680 DATA 20,C9,FF,A2,00,BD,6A,29,20,
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690 DATA 0F,20,C6,FF,A2,00,20,CF,FF,
9D,6D,21,E8,E0,17,D0,F5,20,CC,FF,0B3
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700 DATA A9,01,85,8C,8D,AA,0B,A9,12,
8D,A9,0B,20,7D,FF,93,11,99,92,20,088
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710 DATA 20,20,20,20,20,20,20,12,20,
20,20,20,20,20,20,20,20,20,20,20,027
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720 DATA 20,20,20,20,20,20,20,20,20,
20,20,0D,9A,92,11,54,52,20,20,53,03E
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730 DATA 45,20,20,4C,45,20,20,54,49,
54,4C,45,20,20,20,20,20,20,20,20,03D
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740 DATA 20,20,20,54,59,50,45,20,20,
20,20,20,20,20,20,C5,C5,C5,C5,C5,067
B
750 DATA C5,C5,C5,C5,C5,C5,C5,C5,C5,
C5,C5,C5,C5,C5,C5,C5,C5,C5,C5,C5,0F6
4
760 DATA C5,C5,C5,C5,C5,C5,C5,C5,C5,
C5,C5,C5,C5,C5,C5,9E,00,20,4E,22,0CB
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770 DATA AD,A9,0B,F0,19,20,8F,22,20,
4E,22,AD,A9,0B,F0,0E,20,8F,22,AD,07A
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780 DATA A9,0B,F0,06,20,59,22,4C,5D,
21,20,E9,20,A2,0F,20,C9,FF,A2,00,077
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790 DATA BD,64,29,20,D2,FF,E8,E0,06,
D0,F5,20,CC,FF,A2,0F,20,C6,FF,20,0B6
F
800 DATA CF,FF,48,20,CF,FF,20,CF,FF,
48,20,CC,FF,A9,24,20,D2,FF,68,20,0B6
B
810 DATA BB,20,68,20,BB,20,20,7D,FF,
20,42,4C,4F,43,4B,53,20,46,52,45,06B
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820 DATA 45,0D,00,20,A4,20,A9,00,85,
8C,4C,C6,1E,AD,A9,0B,F0,05,A9,31,075
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830 DATA 20,4C,20,60,20,7D,FF,11,20,
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840 DATA 53,53,20,41,4E,59,20,4B,45,
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850 DATA 55,45,9E,92,00,20,E4,FF,F0,
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860 DATA 8D,A8,0B,85,FD,A2,0D,20,C6,
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870 DATA AA,0B,E6,FD,E6,FD,20,CF,FF,
85,FC,A5,FD,85,FF,20,CF,FF,F0,0C,0DF
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880 DATA 8D,F9,29,20,CF,FF,8D,FA,29,
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7
890 DATA 00,20,CF,FF,E6,FD,99,BD,0B,
C8,18,C0,10,90,F2,A0,F3,20,CF,FF,0BE
5
900 DATA 99,08,29,E6,FD,A5,90,F0,03,
8D,A8,0B,C8,D0,EE,A5,FC,D0,0C,AD,0BC
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910 DATA BD,0B,D0,07,AD,A8,0B,D0,16,
F0,A9,A5,8C,F0,03,20,30,23,AD,A7,096
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920 DATA 0B,F0,03,20,18,23,AD,A8,0B,
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930 DATA F0,08,D9,BD,0B,D0,07,C8,D0,
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940 DATA F9,29,20,AE,23,AD,FA,29,20,
AE,23,AD,04,2A,20,AE,23,B9,BD,0B,082
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950 DATA F0,06,20,D2,FF,C8,D0,F5,A5,
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960 DATA 00,29,A5,FC,29,40,F0,07,A2,
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970 DATA CA,20,20,CC,FF,20,A4,20,20,
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980 DATA A8,A2,08,20,BA,FF,A9,00,20,
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990 DATA CF,FF,20,D2,FF,C9,0D,D0,F6,
20,CC,FF,20,A4,20,A9,9E,A2,0D,20,0B4
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1000 DATA CA,20,4C,C9,1E,20,BB,20,A9
,20,AA,4C,CA,20,A9,42,2C,A9,41,8D,08
4F
1010 DATA 28,24,8D,3C,24,20,7D,FF,92
,11,20,20,49,4E,53,45,52,54,20,44,05
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1020 DATA 49,53,4B,20,49,4E,20,44,52
,49,56,45,20,20,20,20,96,12,41,92,05
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1030 DATA 20,54,4F,20,41,42,4F,52,54
,9E,0D,00,20,59,22,C9,41,D0,03,4C,05
CA
1040 DATA E4,20,20,7C,20,20,EC,26,A9
,31,20,4C,20,A2,0F,20,C9,FF,A2,00,07
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1050 DATA BD,5C,29,20,D2,FF,E8,E0,07
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,D2,FF,20,CC,FF,A2,A6,86,FF,20,3B,0A
6C
1070 DATA 28,A2,0D,20,C9,FF,A9,00,20
,D2,FF,20,CC,FF,20,EC,26,A9,32,20,09
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1080 DATA 4C,20,4C,A4,20,A9,12,8D,00
,0C,A9,01,8D,01,0C,20,7C,20,AD,00,05
7D
1090 DATA 0C,F0,EB,8D,A9,0B,AD,01,0C
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1100 DATA BD,00,0C,F0,05,EA,EA,9D,00
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3E
1110 DATA 32,8D,74,29,20,67,20,20,1B
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1120 DATA 32,29,AE,7E,29,AD,7F,29,20
,CA,20,4C,5B,24,20,7D,FF,93,0D,20,07
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1130 DATA 20,20,20,20,20,20,20,20,20
,20,20,20,12,4C,4F,43,4B,20,41,4C,03
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1140 DATA 4C,20,46,49,4C,45,53,92,0D
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1150 DATA 20,59,22,20,4E,24,20,7D,FF
,0D,0D,20,20,20,20,20,20,20,20,12,03
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1160 DATA 41,4C,4C,20,46,49,4C,45,53
,20,41,52,45,20,4E,4F,57,20,4C,4F,05
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1170 DATA 43,4B,45,44,92,9E,0D,00,4C
,C6,1E,20,7D,FF,93,0D,20,20,20,20,06
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1180 DATA 20,20,20,20,20,20,20,20,12
,55,4E,4C,4F,43,4B,20,41,4C,4C,20,03
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1190 DATA 46,49,4C,45,53,92,0D,00,A9
,29,8D,76,24,A9,BF,8D,77,24,20,59,07
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1200 DATA 22,20,4E,24,20,7D,FF,0D,0D
,20,20,20,20,20,20,20,12,41,4C,4C,04
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1210 DATA 20,46,49,4C,45,53,20,41,52
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1220 DATA 4B,45,44,92,9E,0D,00,4C,C6
,1E,A2,00,86,FF,20,3B,28,A2,0D,20,06
BA
1230 DATA C9,FF,A2,00,BD,00,0C,20,D2
,FF,E8,D0,F7,4C,CC,FF,20,4C,20,A2,0B
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1240 DATA 0D,20,C6,FF,A2,00,20,CF,FF
,9D,00,0C,E8,D0,F7,4C,CC,FF,20,7D,0A
8E
1250 DATA FF,93,0D,20,20,20,20,20,20
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5A
1260 DATA 20,45,4E,54,49,52,45,20,44
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1270 DATA 7D,FF,0D,0D,20,20,20,20,20
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BD
1280 DATA 4F,57,20,57,52,49,54,45,20
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BA
1290 DATA 00,4C,C6,1E,20,7D,FF,93,0D
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CC
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,0D,0D,20,20,20,12,44,49,53,4B,20,04
8A
1320 DATA 49,53,20,4E,4F,20,4C,4F,4E
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1330 DATA 52,4F,54,45,43,54,45,44,92
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1340 DATA 20,20,20,20,20,20,20,20,20
,20,20,20,20,12,54,52,41,43,45,20,03
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1350 DATA 41,20,46,49,4C,45,92,0D,0D
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1360 DATA 20,FA,26,D0,CD,AD,F9,29,8D
,A9,0B,AD,FA,29,8D,AA,0B,20,3F,29,09
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1370 DATA 20,F4,28,20,E9,20,CA,E8,E0
,10,F0,36,8A,48,20,1B,29,AD,A9,0B,08
C4
1380 DATA 08,20,BB,20,28,F0,32,20,32
,29,AD,AA,0B,20,BB,20,A9,31,20,4C,06
6B
1390 DATA 20,A2,0D,20,C6,FF,20,CF,FF
,8D,A9,0B,20,CF,FF,8D,AA,0B,20,CC,09
FF
1400 DATA FF,68,AA,4C,94,26,20,E9,20
,20,59,22,A2,FF,4C,8A,26,20,CC,FF,09
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1410 DATA 20,A4,20,68,A9,00,8D,A7,0B
,20,E9,20,4C,C6,1E,A9,00,2C,A9,01,07
0C
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,20,7D,FF,96,12,41,92,9E,20,54,4F,08
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,20,20,20,20,20,20,20,20,20,20,20,03
58
1440 DATA 20,12,96,44,92,9E,20,46,4F
,52,20,44,49,52,45,43,54,4F,52,59,06
18
1450 DATA 0D,00,20,59,22,C9,41,D0,09
,20,CC,FF,20,A4,20,4C,E4,20,C9,44,07
B7
```

```
1460 DATA D0,17,A9,00,8D,A7,0B,A9,60
,8D,C9,1E,20,24,21,A9,A2,8D,C9,1E,08
70
1470 DATA 68,68,4C,00,00,A9,01,8D,A7
,0B,A2,0F,A9,A0,9D,AC,0B,9D,09,29,07
22
1480 DATA CA,10,F7,20,7D,FF,0D,0D,45
,4E,54,45,52,20,46,49,4C,45,4E,41,06
D4
1490 DATA 4D,45,0D,0D,00,A2,00,20,CF
,FF,C9,0D,F0,08,9D,AC,0B,E8,E0,10,08
36
1500 DATA D0,F1,A9,00,85,8C,20,7C,20
,20,EF,26,A9,31,20,4C,20,20,8F,22,07
A3
1510 DATA A5,FC,D0,35,AD,A9,0B,D0,EF
,20,3F,29,20,F4,28,20,7D,FF,0D,0D,09
40
1520 DATA 96,20,20,20,20,20,20,20,20
,20,20,20,20,20,12,46,49,4C,45,20,03
88
1530 DATA 4E,4F,54,20,46,4F,55,4E,44
,11,9E,92,0D,00,4C,FA,26,A9,00,8D,06
7D
1540 DATA A7,0B,AA,60,A9,09,8D,7F,28
,A9,40,8D,80,28,20,7D,FF,93,0D,9E,08
9A
1550 DATA 20,20,20,20,20,20,20,20,20
,20,20,20,20,20,12,4C,4F,43,4B,20,03
1B
1560 DATA 41,20,46,49,4C,45,92,0D,0D
,00,A9,E5,8D,58,27,A9,27,8D,59,27,06
A4
1570 DATA 20,FA,26,D0,C3,20,6D,28,20
,7D,FF,20,49,53,20,4E,4F,57,20,4C,07
60
1580 DATA 4F,43,4B,45,44,0D,00,4C,C6
,1E,A9,30,8D,59,29,A5,FF,C9,64,90,07
EC
1590 DATA 09,E9,64,85,FF,EE,59,29,B0
,F1,20,AE,20,8E,5A,29,8D,5B,29,A2,09
9D
1600 DATA 0F,20,C9,FF,A2,00,BD,52,29
,20,D2,FF,E8,E0,0A,D0,F5,4C,CC,FF,0B
70
1610 DATA A9,31,8D,74,29,20,67,20,20
,3B,28,A2,0D,20,C9,FF,A5,FC,09,40,07
AF
1620 DATA 20,D2,FF,20,CC,FF,A9,32,8D
,74,29,20,67,20,20,A4,20,A9,0D,AA,08
CC
1630 DATA 20,CA,20,4C,F4,28,20,7D,FF
,93,0D,9E,20,20,20,20,20,20,20,20,06
4C
1640 DATA 20,20,20,20,20,12,55,4E,4C
,4F,43,4B,20,41,20,46,49,4C,45,92,04
B1
1650 DATA 0D,0D,00,A9,29,8D,7F,28,A9
,BF,8D,80,28,A9,9B,8D,58,27,A9,28,07
DE
1660 DATA 8D,59,27,20,FA,26,D0,C2,20
,6D,28,20,7D,FF,20,49,53,20,4E,4F,07
A9
1670 DATA 57,20,55,4E,4C,4F,43,4B,45
,44,0D,00,4C,C6,1E,A9,AC,85,07,A0,06
8A
1680 DATA 0B,84,08,A0,0F,B1,07,99,09
,29,88,10,F8,20,7D,FF,00,00,00,00,05
F5
1690 DATA 00,00,00,00,00,00,00,00,00
,00,00,00,00,60,20,7D,FF,0D,20,20,02
49
1700 DATA 20,20,20,20,20,20,20,20,20
,54,52,41,43,4B,20,00,60,20,7D,FF,04
B1
1710 DATA 20,53,45,43,54,4F,52,20,00
,60,20,7D,FF,93,0D,12,9E,46,49,4C,06
37
1720 DATA 45,4E,41,4D,45,3A,2D,00,60
,42,2D,50,20,31,33,20,30,30,30,4D,04
6D
1730 DATA 2D,57,01,01,01,41,0D,4D,2D
,52,FA,02,03,4D,2D,52,90,07,17,49,04
63
1740 DATA 30,23,55,31,3A,31,33,20,30
,20,30,30,20,30,30,0F,58,52,57,4D,04
24
1750 DATA 3B,2B,44,40,4C,55,4A,4B,54
,41,42,A3,20,49,1F,5A,1F,CA,1F,30,05
B4
1760 DATA 20,F0,20,23,21,6E,23,9A,25
,F0,25,A6,24,07,25,4A,26,E4,27,9A,06
E4
1770 DATA 28,20,7D,FF,44,45,4C,45,54
,45,44,20,20,00,60,20,7D,FF,53,45,06
8F
1780 DATA 51,20,20,20,20,20,20,00,60
,20,7D,FF,50,52,4F,47,52,41,4D,20,05
45
1790 DATA 20,00,60,20,7D,FF,55,53,45
,52,20,20,20,20,20,00,60,20,7D,FF,05
F7
1800 DATA 52,45,4C,41,54,49,56,45,20
,00,60,AE,BC,CA,D8,00,00,00,00,00,05
E8
1810 DATA END
63995 PRINT"(CLR)":COLOR0,1:COLOR4,1
:CHAR1,10,12,"(YEL)WORKING....$",1:C
HAR1,14,14,"PLEASE  WAIT",1:RESTORE
63996 READA$:S=DEC(A$):E=S:DO:READB$
:IFB$="END"THENEXIT
63997 SU=0:FORJ=0TO19:B=DEC(B$):POKE
E+J,B:SU=SU+B:CHAR1,22,12,HEX$(E+J)+
"=$"+B$,1
63998 READB$:NEXT:E=E+20:IFSU< >DEC(B
$)THENPRINT"(CLR)(DOWN)(DOWN)(DOWN)(
DOWN)(DOWN)(LRED)DATA ERROR IN LINE"
PEEK(65)+256*PEEK(66):END
63999 LOOP:INPUT"(CLR)(DOWN)(DOWN)(D
OWN)(DOWN)(DOWN)(DOWN)FILENAME OF TA
RGET FILE:";N$:BSAVE(N$),B0,P(S)TOP(
E):END
```





commodore

128 This month there's good news... and there's bad news! The bad news is the 128D price increase (but we've increased our discount to soften the blow!) The good news is our super summer price offer on all Viza products... lowest ever SuperBase prices... and more great 128 books!

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Scratchpad

Eric Doyle presents a selection of your routines.

While delving through my box of routines I came across this one from one of our many Australian readers. This particular Wizard of Oz is **Anthony Garrett** of **Capel, Western Australia**, and he has conjured up a routine which will make a NEWed program reappear as if by magic. Obviously, its all entered in direct mode on any C64:

```
POKE 2050,8
SYS 42291
POKE 45, PEEK(174)
POKE 46, PEEK(175)
POKE 47, PEEK(174)
POKE 48, PEEK(175)
POKE 49, PEEK(174)
POKE 50, PEEK(175)
CLR
```

When NEW is entered two zero bytes are placed in the first two program memory locations. These normally tell the computer where to find the next line but two zero bytes say 'that's your lot, pal'. All programs end with two zeros and the LIST and RUN commands react by leaping back to the familiar READY message above a flashing cursor. Naturally enough, if zeros are the first bytes these routines receive then they assume there's nothing worth reading and switch off straight away.

The first line gives a value to one of these bytes. It's not the correct value so the second line jumps to the ROM routine which rechains the lines. This is one of the clever little routines which the Operating System uses when you add a line in the middle of an existing program. The effect is that the first two bytes are changed to their correct values so the program is all there now.

Unfortunately, no-one's told the rest of the computer, so it still won't run yet. This is where the other lines come in. Locations 174 and 175 now point to the end of the program but we have to make sure that locations 45 to 50 know this by poking the values in.

PROGRAM: SLOW PRINT

```
10 REM SLOW PRINT
20 A$="THIS STRING HOLDS YOU
R MESSAGE"
30 LE=LEN(A$):L=(40-LE)/2:C=
0
40 PRINT"(HOME)(DOWN)(DOWN)(
DOWN)(DOWN)(DOWN)";TAB(L)
50 FORA=1 TO LE
60 PRINT MID$(A$,A,1);
70 FOR B=1 TO 100:NEXTB,A
80 IF C=1 THEN 140
90 PRINT"(HOME)(DOWN)(DOWN)(
DOWN)(DOWN)(DOWN)(RVS)";TAB(
L)
100 FOR A=1 TO LE
110 PRINT MID$(A$,A,1);
120 FOR B=1 TO 100:NEXTB,A
130 PRINT"(OFF)":C=C+1:GOTO
40
140 END
```

PROGRAM: SCROLL

```
10 REM SCROLL STRING LEFT
20 LL=15
30 A$="                INSERT
 YOUR MESSAGE HERE...."
40 A$=A$+"UP TO 255 CHARACTE
RS.... "
50 LE=LEN(A$):L=(40-LL)/2
60 FOR A=1 TO LE
70 PRINT"(HOME)(DOWN)(DOWN)(
DOWN)(DOWN)(DOWN)";TAB(L)
80 PRINT MID$(A$,A,LL)
90 FORB=1TO100:NEXT B,A
```

Even now they're still not quite correct but a simple CLR command sorts them out poperly. Et voila, back comes the old program.

Staying the Basic for a while, **K B Blight** of **Milton Keynes**, has two string handling routines to give your title pages a bit of pzazz.

In both routines LE is the length of the string and L calculates a TAB value to whack it in at the centre of the screen. Beyond that, my lips are sealed. If you want to know what happens you'll have to try them for yourself.

Staffordshire is famous for pottery and **Steve Kimberley**, who is well known as someone who likes pottering about with C-16s to produce programs such as Cyborg. He writes, to give everyone the benefit of his experience:

'A listing is useful for debugging or producing a hard copy of some code. This program will allow the user to send monitor-style or disassembled code to a printer. Save the program and then run it. Specify M or D with the start and finish of your code and it will print the desired section."

PROGRAM: PROTECTOR

```
100 INPUT"PLEASE ENTER YOUR
NAME";NA$
110 NA$=CHR$(147)+"SORRY "+N
A$+". I CAN'T DO THAT."
120 FOR X=1 TO LEN(NA$)
130 POKE49301+X,ASC(MID$(NA$
,X,1))
140 NEXT
150 POKE49301+X,0
160 FOR X=49264 TO 49300
170 READ A:POKE X,A:NEXT
180 SYS 49264
190 DATA 169,123,141,6,3,169
,192,141
200 DATA 7,3,96,169,149,160,
192,32,30
210 DATA 171,76,116,164,0,0,
0,0,0
220 DATA 169,26,141,6,3,169,
167,141,7,3,96
```

"The program will autorun after the first time to allow the printing of more than one block of code."

Steve also reminds us not to use the Basic program storage area at $1000 for the code because the program overwrites it. We wouldn't be that stupid would we? Well, would we?

Malcolm Serbert of **Harrogate** has something simple, short and effective which he'd like to share with the world. It's a loader routine for safeguarding your C64 programs.

The program works by asking the user's name and then storing a message high in memory. It then points the LIST jump vector to a routine which will print the message on the screen. The net effect is that any user naughty enough to try listing the program is greeted by a personalised refusal.

The machine code breaks down into three simple routines:

49264-49274 points the LIST vector to the print message routine.
49275-49289 the print message routine
49290-49300 restores the LIST vectors

The last section of code is called by SYS 49290. In the interests of secrecy it can be omitted by leaving out line 220 and changing the larger number in the loop in line 160 to 49289.

The sneakier readers of the magazine might also like to try hiding a trap in the protected program in case some bright spark loads it after bypassing the protection routine. Use this in your program exactly as it is printed, without spaces between the commands:

```
10 GOSUB1000
1000 A=PEEK(49268):REM"
1010 IFA<>3THENSYS785:REM"
1020 RETURN
```

Then move the cursor on to the space after the quotation marks in line 1000. Hold down CTRL, press RVS ON. Next press the letter T, 18 times. Get out of revs mode and type something like FOR A = 1 TO 100. Repeat this procedure on line 1010 using 21 reversed T's and type NEXT A immediately after them.

When you list this part of the program the REMs overwrite the actual statements making it look like a harmless delay loop. Not foolproof I admit, but it's fun!

If you're itching to see your crafty routines in print send them to: Scratchpad, Your Commodore, 1 Golden Square, London WR1 3AB.

PROGRAM: C16 M/C LISTER

```
10 REM C16 M/C LISTER
20 POKE52,19:POKE56,19
30 COLOR0,1
40 COLOR1,2,7
50 SCNCLR:PRINT"(DOWN)(DOWN)(DOWN)(DOWN)(DOWN)(DOWN)(RGHT)(RGHT)(RGHT)(RGHT)(RGHT)(RGHT)(RGHT)(RGHT)(RGHT)(RGHT)(RGHT)(RGHT)(RGHT)ZZZ TO QUIT"
60 PRINT"(DOWN)(DOWN)(RGHT)(RGHT)(RGHT)(RGHT)(RGHT)";
70 INPUT"MONITOR OR DISASSEMBLE M/D";X$
80 IF X$="ZZZ" THEN END
90 IF X$<>"M" AND X$<>"D" THEN 50
100 PRINT"(DOWN)(RGHT)(RGHT)(RGHT)(RGHT)(RGHT)(RGHT)(RGHT)(RGHT)(RGHT)(RGHT)(RGHT)";
110 INPUT "START ADDRESS";A$
120 PRINT"(DOWN)(RGHT)(RGHT)(RGHT)(RGHT)(RGHT)(RGHT)(RGHT)(RGHT)(RGHT)";
130 INPUT "FINISH ADDRESS";B$
140 COLOR1,1
150 SCNCLR
160 PRINT X$;" ";A$;" ";B$
170 PRINT"X"
180 PRINT"(DOWN)(DOWN)PRINT#1:CLOSE1:GOTO30(HOME)";
190 POKE1319,13:POKE1320,13:POKE1321,13:POKE239,3
200 OPEN1,4:CMD1:MONITOR
```

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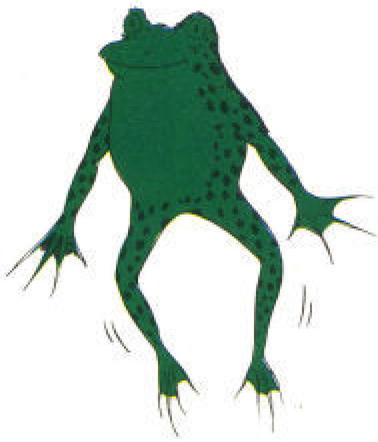
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FROGG

PROGRAM: SCREEN DATA

```
START= 24576
NO.BYTES= 1024
24576 :2020202020202020   CH : 256
24584 :2020202020202020   CH : 256
24592 :2020202020202020   CH : 256
24600 :2020202020202020   CH : 256
24608 :2020202020202020   CH : 256
24616 :2020202020202020   CH : 256
24624 :2020202020202020   CH : 256
24632 :2020202020202020   CH : 256
24640 :2020202020202020   CH : 256
24648 :2020202020202020   CH : 256
24656 :2020202020202020   CH : 256
24664 :2020202020202020   CH : 256
24672 :2020202020202020   CH : 256
24680 :2020202020202020   CH : 256
24688 :2020202020202020   CH : 256
24696 :20E6E6E6E6E6E6E6   CH : 1642
24704 :E6E6E6E6E6E6E6E6   CH : 1840
24712 :E6E6E6E6E6E6E6E6   CH : 1840
24720 :E6E6E6E6E6E6E6E6   CH : 1840
24728 :E6E6E6E620202020   CH : 1048
24736 :202020E6E6202020   CH : 652
24744 :2020202020202020   CH : 256
24752 :2020202020202020   CH : 256
24760 :2020202020202020   CH : 256
24768 :20202020E6202020   CH : 454
24776 :202020E6E6202020   CH : 652
24784 :2020202020202020   CH : 256
24792 :2020202020202020   CH : 256
24800 :2020202020202020   CH : 256
24808 :20202020E6202020   CH : 454
24816 :202020E6E6E6E620   CH : 1048
24824 :E6E6E6E6202020E6   CH : 1246
24832 :E6202020E6E62020   CH : 850
24840 :20E6E62020E62020   CH : 850
24848 :20E62020E6202020   CH : 652
24856 :202020E6E6202020   CH : 652
24864 :20E62020E620E620   CH : 850
24872 :20E620E62020E620   CH : 850
24880 :E62020E62020E620   CH : 850
24888 :E6202020E6202020   CH : 652
24896 :202020E6E6202020   CH : 652
24904 :20E620E62020E620   CH : 850
24912 :20E620E620202020   CH : 652
24920 :E620202020202OE6   CH : 652
24928 :20202020E6202020   CH : 454
24936 :202020E6E6202020   CH : 652
24944 :20E62020E620E620   CH : 850
24952 :20E620E62020E620   CH : 850
24960 :E62020E6202020E6   CH : 850
24968 :20202020E6202020   CH : 454
24976 :202020E6E6202020   CH : 652
24984 :20E62020E62020E6   CH : 850
24992 :E6202020E6E6E620   CH : 1048
25000 :20E6E6E6202020E6   CH : 1048
25008 :20202020E6202020   CH : 454
25016 :2020E6E6E6202020   CH : 850
25024 :2020202020202020   CH : 256
25032 :2020202020202020   CH : 256
25040 :2020202020202020   CH : 256
25048 :20202020E6202020   CH : 454
25056 :2020202020202020   CH : 256
25064 :2020202020202020   CH : 256
25072 :2020202020202020   CH : 256
25080 :2020202020202020   CH : 256
25088 :2020202020202020   CH : 256
25096 :20E6E6E6E6E6E6E6   CH : 1642
25104 :E6E6E6E6E6E6E6E6   CH : 1840
25112 :E6E6E6E6E6E6E6E6   CH : 1840
25120 :E6E6E6E6E6E6E6E6   CH : 1840
25128 :E6E62020E6202020   CH : 850
25136 :2020202020202020   CH : 256
25144 :2020202020202020   CH : 256
25152 :2020202020202020   CH : 256
25160 :2020202020202020   CH : 256
25168 :2020202020202020   CH : 256
25176 :2020202020202020   CH : 256
25184 :2020202020202020   CH : 256
25192 :2020202020202020   CH : 256
25200 :2020202020202020   CH : 256
25208 :2020202020202020   CH : 256
25216 :2020202020202020   CH : 256
25224 :1012051313200609   CH : 124
25232 :120520140F201314   CH : 161
25240 :0112142020202020   CH : 199
25248 :2020202020202020   CH : 256
```



THIS MONTH'S ARTICLE IS the final one in the series (all together — Aah!) so I shall finish off by adding a title screen. The data should be typed in using the entry routine provided in the first article (*Your Commodore*, January '86). The start address is 24576 and the number of bytes is 1024. Save it under the name of "FROGSCRN".

The short piece of code simply sets the background colour to black, sets all character squares to blue foreground and transfers the data from $6000 to $0400 (the video matrix). Finally JOYREAD is called to test for a depression of the firebutton. That's it!

Enjoy yourself, and watch out for menacing Frenchmen!

Daryl Bowers completes his arcade series.

```
25256 :2020202020202020   CH : 256
25264 :2020202020202020   CH : 256
25272 :2020202020202020   CH : 256
25280 :2020202020202020   CH : 256
25288 :2020202020202020   CH : 256
25296 :2020202020202020   CH : 256
25304 :2020202020202020   CH : 256
25312 :2020202020202020   CH : 256
25320 :2020202020202020   CH : 256
25328 :2020202020202020   CH : 256
25336 :2020202020202020   CH : 256
25344 :2020202020202020   CH : 256
25352 :2020202020202020   CH : 256
25360 :2020202020202020   CH : 256
25368 :2020202020202020   CH : 256
25376 :2020202002192004   CH : 191
25384 :0112190C20020F17   CH : 128
25392 :051213204E323034   CH : 275
25400 :4545303531323133   CH : 438
25408 :3230343430353132   CH : 402
25416 :3133323030303531   CH : 396
25424 :3231333232303531   CH : 400
25432 :3231333330353132   CH : 401
25440 :3131303531323230   CH : 396
25448 :3531313035353030   CH : 401
25456 :3031313231393043   CH : 417
25464 :3230303230463137   CH : 418
25472 :3730313132313930   CH : 405
25480 :4332303032304631   CH : 430
25488 :3130313132313930   CH : 399
25496 :4332303032304646   CH : 451
25504 :3031313231393043   CH : 417
25512 :3230303230303031   CH : 389
25520 :3132313930433230   CH : 418
25528 :3032323031313231   CH : 393
25536 :3930433230303030   CH : 414
25544 :3131323139304332   CH : 419
25552 :3030303131323139   CH : 398
25560 :3043323230313132   CH : 411
25568 :3139304343303131   CH : 434
25576 :3231393030303131   CH : 398
25584 :3231393930313132   CH : 409
25592 :3131303131323230   CH : 392
READY.
```

```
2880                 JSR TITLE


11800 FINAL          JSR WAIT3
11810                JSR RVARS
11820                JSR INIT
11830                RTS
11840                ;


14510 TITLE          LDA #0
14520                STA $D021
14530                LDA #6
14540                LDY #0
14550 COLOOP
14560                STA $D800,Y
14570                STA $D900,Y
14580                STA $DA00,Y
14590                STA $DAF8,Y
14600                DEY
14610                BNE COLOOP
14620                ;
14630                LDY #0
14640 NXLOOP
14650                LDA $6000,Y
14660                STA $0400,Y
14670                LDA $6100,Y
14680                STA $0500,Y
14690                LDA $6200,Y
14700                STA $0600,Y
14710                LDA $62F8,Y
14720                STA $06F8,Y
14730                DEY
14740                BNE NXLOOP
14750 NXCHK
14760                JSR JOYREAD
14770                BCS NXCHK
14780                RTS
14790                ;
14800 FINISH
14810                .END
```

EXHIBITIONism

IT'S NOT OFTEN THAT THE COMPUTER Press gets excited, but the official launch of the Amiga was an event not to be missed. For once the lure of a Champagne Breakfast wasn't the main attraction and the buzz which was going around wasn't the sound of all-night copywriters catching up on their sleep.

We were shepherded past Llamasoft's stand into the Commodore Theatre and the tension mounted. At last the gods would descend and reveal to us mere mortals the price of their great miracle. Never since Moses was given the Tablets of Stone had words been awaited with such great expectation.

Enter the Amiga

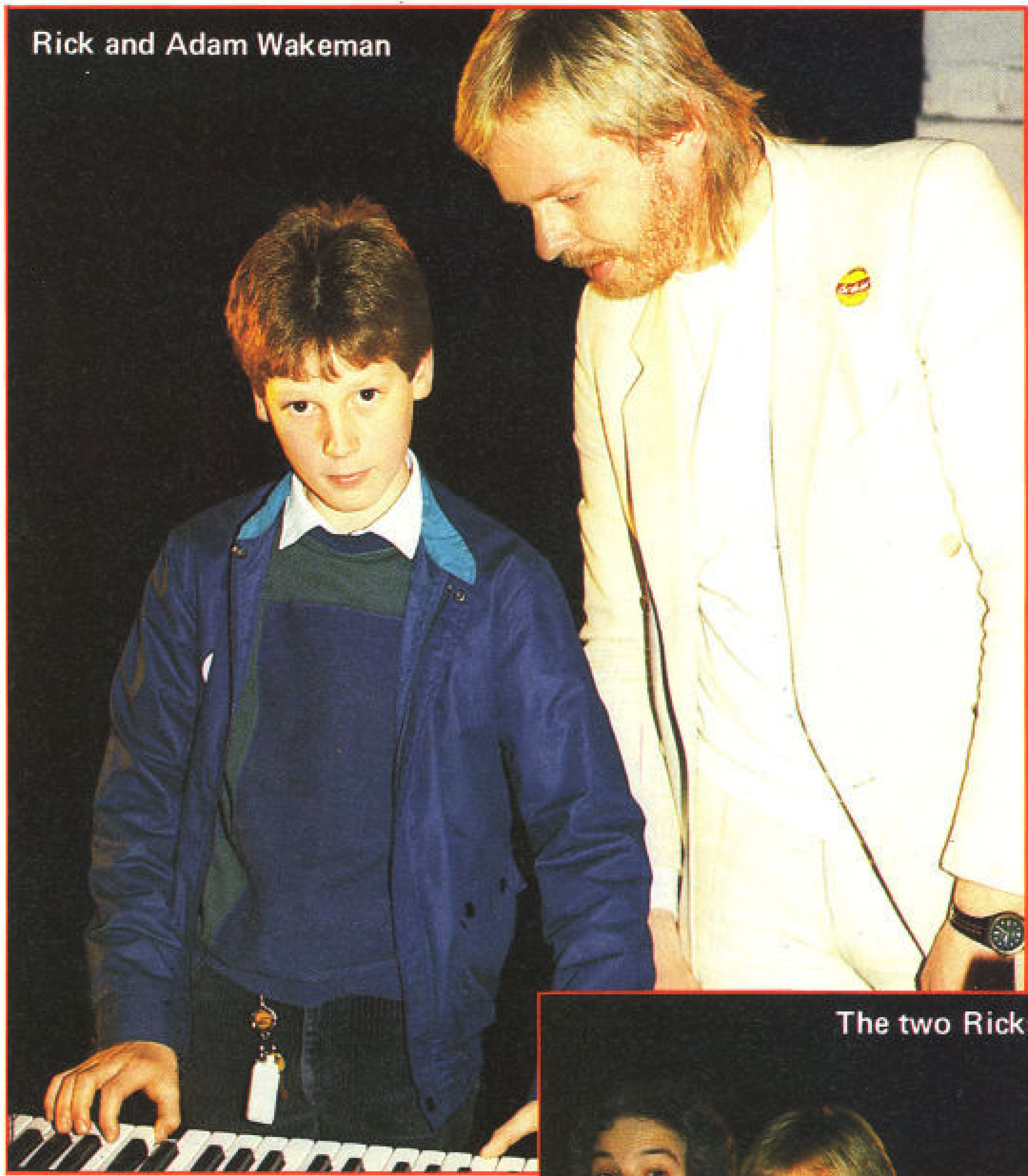
The reality was about as exciting as Moses disclosing a note to his milkman. With such a revolutionary piece of hardware one would have anticipated demos galore, flashing lights and inspirational music. All we got was Chris Kaday, a slide show and the intrusive strains of music for Psychedelia from the Llamasoft stand.

Admittedly, the slide show was produced by projected images from an Amiga which were, in their way, impressive but they merely gave a hint at the capabilities of the machine. No Amiga ball this time just images to help the pep talk along. Oh yes, and the price. Any dreams of a sub £1000 price tag were soon shattered (if any such romantic dreams were still with us). The stark reality is £1475 + VAT with a single disk drive, which means £3.75 change from £1700 for the more modest machine and £1675 + VAT for the twin drive version.

Music Sales' demonstration of the new *Music Expansion System* under the magic touch of megastar Rick Wakeman was far more impressive, but more of this later.

Outside the theatre the Show was coming to life like some great monster stirring itself after a year of hibernation. Another shock-horror story was waiting to unfold. Where were the big boys. US Gold and Ariolasoft? I mean no disservice to Bubble Bus, Llamasoft, Mirrorsoft, Martech, Anco, Tynesoft and Level 9 who all made the effort to meet the people they serve so well, but the many games publishers were noticeable by their absence. Where were they all?

At least there was plenty for the punter in the bargain basement. At times it seemed more like a Middle Eastern bazaar than an exhibition, with milling crowds and cut-price offers. Not that we saw much of a throng on Saturday with the FA Cup's inevitable attractions keeping the attendance down. In contrast, Sunday was like the good old days of computer mania, sweaty and swarming.



Rick and Adam Wakeman

Eric Doyle takes a sidelong look at the Seventh Commodore Show.

The scene: Novotel, Hammersmith
The date: Friday, 9th May 1986
The venue: The Seventh Commodore Show
The time: 9.30am
The event: The Official Amiga Launch

Upstairs the scene was beginning to look like the Commodore Pet Shows of yore with the principal commodity being business software for the 64, 128 and Amiga.



The two Ricks

Reactions

The optimistically named Amiga Village was a special area set aside to display the Amiga and its works in all their glory. The new machine was put through its paces for interested groups of visitors but once again the enormous potential of the machine seemed to be trivialised, unless the sight of flying hotdogs turns on you on!

The Amiga is a bit of an enigma at the moment. Its undoubted graphics capabilities and speed make it an extremely desirable acquisition for computer buffs, but how will the business fraternity react. With the long shadow of IBM being cast across the marketplace I wonder if the Amiga's glow will shine brightly enough in the dark.

The general view of showgoers was that the Amiga will be a very strong contender in the area of Computer Aided Design, video graphics generation or even in the publishing world but I've yet to hear a convincing argument for it in the business world. Certainly the software on display failed to take my breath away. Commodore hopes that I'm wrong and would rather see IBM's lengthening shadow as a sign that the sun will soon be setting on its empire, heralding the rebirth of Commodore as a force in industry. Only time will tell if it's a case of welcome back CBM or adios Amiga.

Classics

The most impressive array of hardware was displayed by Viza Software. No other company managed to create the impression of total support for the Commodore range. Kelvin Lacey of Viza was not backward in expressing his surprise that CBM was giving the impression of being a one machine company.

On the Viza stand, were displayed the full range PCs, 128Ds and 64s to show the power of the software. Particularly impressive was the C128 *Viza Classic Cartridge* which must surely be the Rolls Royce of wordprocessors. The cartridge gives instant access to the full power of the program plus the advantages of an 80 column display. Sophistication comes at a price, however, and in this case it is £99.95.

Get Smart

Next door to Viza was a rather forlorn looking area labelled Micropro International. Covering the same area as its neighbour, the stand looked empty because no display equipment had arrived. For the full weekend the staff battled bravely to make their presence felt amongst the empty drinks cans and other debris which their wide open spaces seemed to attract. The new product was equally as small as their display area but its significance is enormous. For the first time a Smart Card was being shown running a program on the 64 and 128.

Smart Cards look like normal credit cards but hidden within their plastic exterior is a small but powerful microchip. Micropro's application was the extremely popular *SuperScript* wordprocessor which simply slots into an adaptor in the cartridge part of the computer. This gives instant access to the user at a relatively modest cost of around £99.



To be Precise

SuperScript is a product from the Precision Software range, the full strength of which was being demonstrated next to the Amiga Village. In all honesty the demonstration of the precision Amiga graphics packages upstaged the official demonstration and visitors to the show squeezed in to the small display area to marvel at the wonders on display.

SuperScript and its companion program *Superbase* have now been combined in the 128 so that both programs can run concurrently and exchange information for mailing list applications, making a very powerful business tool for the small businessman. For those who are still struggling with Superbase, help is at hand with the publication of *Superbase: The Book* and for those who have given up there is the simpler *Superbase Starter*.

US Influence

The appearance of the Amiga has attracted one or two Stateside companies to test the water over here. Timeworks is one such company which was particularly eager to show 128 business software. *Swiftcalc, World Writer* and *Data Manager* will all be appearing during these summer months. I am particularly eager to see the Timeworks Sideways program in operation. This is a spreadsheet utility which prints text along the length of printer paper instead of across the width, saving a lot of the time which collation and pasting together printout sheets normally involves.

And Euro Power

The only true software launch at the show was a utility cartridge from Power Products which is a Dutch company marketing its products through the auspices of Peter Watts' Rainbeck company in this country. The *Power Cartridge* has an impressive array of facilities not least of which is the fact that it employs its own external memory and is transparent to the computer. This means that it does not use a large chunk of memory which could be better used for programming.



Bizarre bazaar bargains

When the going gets tough...



The cartridge offers programming toolkit commands to 64 Basic, turbo tape and disk commands, low and high resolution screen dumps and a machine code monitor.

At long last cartridges seem to be coming into vogue for the 64 and a lot of this attention can be traced back to Germany and Holland. Robtek markets Dutch cartridges amongst its range of products. The *Robtek 50 Cartridge* rarely leaves the cartridge port on my 64 and the *Game Killer* cartridge is proving to be phenomenonly successful amongst the game playing fraternity. Paul Share of Robtek is not slow to point out that the company is not short of ideas for the future. The latest product is a disk maintenance kit which should help prevent the need for costly repairs.

Bright Ideas

My own award for technical innovation at the show must go to Overbase. Bob Glynn revealed his Thingi to the general public and everyone agreed that they'd never seen anything like it. Everyone wanted one. For around £7 you too can have a Thingi just like his. What is it? When I tell you you'll kick yourself for not thinking of the idea yourself.

The best way to describe it is that it is a kind of bulldog clip on a strong plastic arm which attaches to the top of your monitor. The clip will hold a listing or a piece of text which you want to type into your computer. Holding the copy up by your monitor means that eye movement is kept to a minimum and hopefully reduces the strain of constantly referring back and forth from copy to screen. Simple but very effective, the Thingi proved very popular at the show and has the distinction of being compatible with any make of computer!

An alternative use for the Thingi is to clip a picture of your sweetheart or spouse (or both) to it so that you don't forget what they look like!

Opinions

Although some of the big companies weren't there, PR men seemed to throng the bars like piglets round a sow's teats. Grunting and squeaking about their companies latest 'blockbusters' it gave hope for the games market but I felt there was an air of desparation in their cries. There is no doubt that games sales generally are not what they used to be.

One little ray of sunshine in this impending gloom was Mike 'two in the bush' Baxter of Solutions, once described as the most eligible bachelor in PR and still desparately trying to prove it. His is the voice of hope when he says that the full potential of the games market is not being fully realised because the games market lacks genuine innovation. I would tend to agree with this having seen so many 'cloned' games of late.

And the Sheep

One innovator who has been very quiet of late is the ungulophilic Jeff Minter. His new game, *Iridis Alpha*, is still under development but the demo he had running looks very interesting, demonstrating yet another facet of mirror image lateral screen splitting which he pioneered with Sheep in Space.

Keyed Up

Within sight (and unfortunately sound) of Llamasoft was the Commodore Theatre, aforementioned site of the damp squib Amiga launch. During the Show several companies used this as a venue to give full blown demonstrations of products, but none more effectively than Music Sales. Using Rick Wakeman and Rick Cardinali as demonstrators, the full potential of the FM music system was realised.

Once more Chris Kayday was called upon to act as Master of Ceremonies and his performance was quite a contrast to his appearance at the press launch. Life and soul of the party Chris bounced on to the stage and in his best-event-of-the-show-style announced the two Ricks.

The staging could have been better staged by avoiding extensive views of Wakeman's rear end but the music was magic. Now ageing gracefully, Rick Wakeman has divested himself of the long-haired, caped keyboard crusader look of his days with Yes and now merely looks rich. Rick Cardinali, in contrast, is more flamboyant and less rich. Dressed in a style which he self-confessedly describes as 'like the Penguin in Batman', it's a pity that Wakeman no longer employs a cape in his act.

Wakeman and Cardinali make a highly entertaining double act being both talented and witty. The audience sat open-mouthed as Wakeman worked his magic on the ivories of the *Music System* while Cardinali showed the equally impressive power of Music Sales *Sound Sampler*. Even Wakeman's son, Adam, got a look in and left us all wondering if he'd follow in his father's footsteps in future years.

The pièce de resistance of the show was a Commodore rap in which Cardinali distorted his voice through the sampler to give a rich, deep 'black' sound and then turned up the pace to make it sound like a Donald Duck rap.

This performance stole the Show for me, it overshadowed the Amiga demonstrations and even distracted my chauvinistic eyes from the inevitable bevvy of beautiful assistants at the stands.

Overall Impressions

The Show Guide reflected my total impression of the Show itself. It concentrated on the Amiga and the Music System with an old recycled review of the 128. Apart from that and the ads, it had nothing more to say. All in all, it was like an extra edition of a certain magazine.

This year the attendance indicated an upturn in the fortunes of the computer trade but the games field failed to reflect this hope by several noticeable non-appearances. The attitude of the show goers was summed up by one youth, obviously suffering the onset of adolescence. He took a long look at the leggy blonde handing out the Show catalogues and was heard to exclaim, 'Cor, look at the legs on that'. To this his friend replied, 'Never mind those we came to look at computers!'. Such single-minded dedication should have been rewarded with a better showing from the industry.

Runecaster leads you into the dark and complex world of adventures.



THOSE THOUSANDS OF ADVENTURERS who cut their teeth on The Hobbit will probably already have got their copy of 'The Lord of the Rings'.

When it is introduced, 'The Hobbit' set new standards for adventure games. Is this long awaited sequel from Melbourne House going to shine as brightly?

The suspense of waiting has finally given way to an awed feeling of amazement at the size of the program and the way the main characters can interact. This is only part one of a three part trilogy, with the second and third parts still a long way off. The original story was published as three books and the computer game versions will follow this pattern. The first, based on book one, is entitled The Fellowship of the Ring.

The program comes on two cassettes which contain a cut-down beginner's game in addition to the two separate parts of the main adventure. Also included in the package is the 500 plus page book the first part of the trilogy together with an excellent instruction booklet.

The beginner's game is well presented and should prove a good introduction to adventure gaming. Its responses to the input 'HELP' are fairly direct and give the newcomer a good idea of what adventures are all about. The main adventures do not recognise this command!

Although listed in some quarters as a graphics adventure, very few pictures are used in the main game, most appearing in the beginner's version. What graphics there are, are not very inspiring and in no way create the atmosphere found in The Hobbit.

When starting the game you will be asked which of the four hobbits — Frodo, Sam, Pippin or Merry — you wish to control. You may choose one or more but whilst playing one character, the others will generally follow the leader unless specifically told to do otherwise.

The screen display resembles a stack of four sheets of paper slightly displaced, so that in addition to the top piece, a little of the left hand side of the three other sheets may also be seen. Pictures of characters at your present location are shown at the left on the top sheet. Main characters elsewhere are shown on the three sheets underneath.

The game has many of the ingredients of the original book. Players who have read The Fellowship of the Ring will often have a feeling of dèja-vu. Reading the book is recommended as this game follows the story more closely than The Hobbit game did. Far from spoiling the adventure, this adds to the pleasure for Lord of the Rings fans and there are still plenty of puzzles to be solved!



There are plenty of locations to explore which contain nothing of special importance in solving the game but which add a lot to the general atmosphere. This greatly increases the feeling of a role playing game.

There is much to command in Melbourne House's latest epic, sadly there is a darker side to the coin too. Program operation is desperately slow, there are a number of fatal bugs that will cause the program to crash and some of the responses to input commands are ludicrous to say the least.

Nearly all actions result in a fair amount of text being displayed. This takes some time to appear, no doubt partially due to the program also working out what the various independent characters are doing at that time. Move Frodo to a new location and the three other hobbits, together with any other companions, will follow him in their own good time!

Half a minute between moves is good going, sometimes over a minute is required to regain control of the input cursor to enter your next command! The program will crash if you go into a dark place without matches to light your way and I've heard reports of other situations that give a similar result.

Such is a complexity of the game that it is not possible to QUIT and just start from the beginning — you must reload the program from scratch. This can be overcome to some extent by frequent SAVEings of your game position on a separate data tape but again this process does tend to slow the game play somewhat.

Complex input commands are accepted, as is talking to other characters (a necessity on occasions). With such a complicated parser it is perhaps not surprising that some strange responses are produced but it can be a bit annoying when an item passed from

one hobbit to another is lost in the process!

For all its faults The Lord of the Rings is a marvellous game for anyone with the blood of Middle Earth in their veins. Newcomers to this wonderful world may well despair but those of us who have waited for further hobbit travels from the Shire will sit back and enjoy the experience.

Americana

Although there have been some notable releases of adventure games from UK writers in the last few months, the continuing trickle of American imports is most welcome. Activision's release of the cassette version of 'Mindshadow' seems to have made other software houses aware of the gains to be made by having games available on something other than disk.

US Gold has recently launched an updated version of an old favourite on both disk and cassette for the C 64/128 — Asylum. This gained popularity some years ago as a crude, but successful, graphics adventure for the TSR 80 as Asylum I. It was followed by a slightly easier version Asylum II but with basically the same plot.

This new version seems to be an improved version of Asylum II, with good graphics and a very devious 3-D maze of corridors and rooms that you must map (with difficulty!) and explore. Escaping eventually through the one and only exit available to you.

The theme is that you have been 'put away' after being found wanderig the streets muttering such phrases as "Take the book and drop the candle" and "Slay the dragon with the sword". Sounds familiar doesn't it!

The door to your room has been inadvertently left unlocked and you must try to find a way to escape. Dressing up as a doctor seems to be the recommended method but first you must find the necessary objects to give your disguise authenticity.

Doors to other rooms will be locked but electronic keys can be found to unlock them. Having opened and examined the contents of these rooms you must remember to close the doors behind you — too many doors left open will set off the alarms!

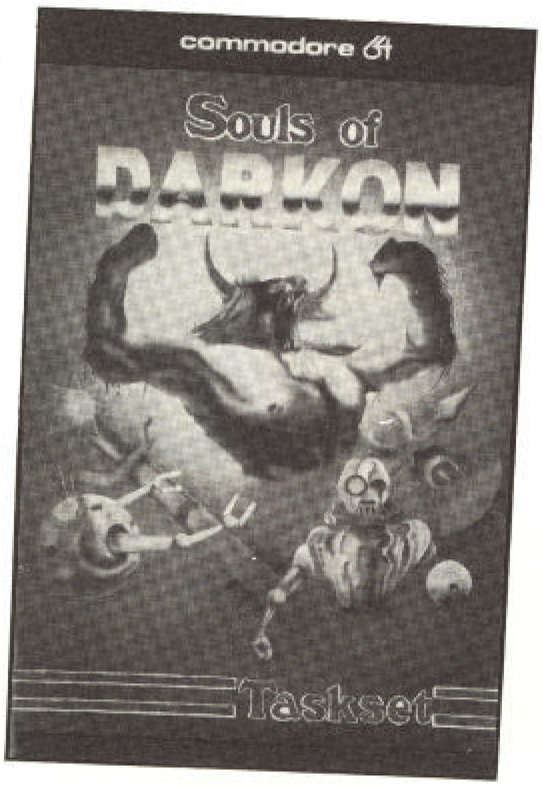
If my memory serves me correctly the original Asylum II had random alarms connected to some doors but this version has not yet caught me that way! On entering a room, you may find a box containing something useful — pick it up and the box disappears, put it down and it reappears in its box!

You may also hide things under the furniture but remember where you put them because there will be no indication of their hiding place once you've set them down. The vocabulary is extensive and may be viewed at any time by pressing function key F1. Key F2 will present a 'slide show' of some of the pictures you may find on your travels.

Input commands recognised are fairly comprehensive allowing such as: "DROP EVERYTHING EXCEPT THE BIRD COSTUME", "TRADE COINS FOR INMATES AXE" and "GET MAGNET, KNIFE AND SILVER CARD". Several commonly used words are recognised by their initial letter, which saves a great deal of typing. "O D W CARD" is a lot quicker than typing "OPEN DOOR WITH CARD".

The graphics are good hi-res pictures and are at their best when you enter special rooms or meet various characters in the corridors. You may move around the corridors by using the cursor keys for turning left or right and the up arrow key for moving forwards. Examine everything, you never know what or where anything useful may be hidden but never "LOOK UP", true to the original version, something unexpected may fall on your head!

It certainly looks as though this program has been given a new lease of life. US Gold should be congratulated on this 'resurrection program' for marketing greatly improved versions of some of the home computer's classic games: The Temple of Apshai Trilogy and now 'Asylum'. What next?



Team Play

Fancy a multi-player adventure game? The Causes of Chaos from CRL offers the opportunity of a six player game. You can either band together or wage war on each other as the mood takes you. Working in unison seems the way to go, as otherwise someone will have to sit there with their eyes shut!

The game is a fairly basic text only adventure, with the aim being to find six stolen royal treasures. At the beginning you must enter how many are to play, their names and how many turns each is allowed (one to nine). The input command is of the type verb/noun and the game does not appear to have a very large vocabulary.

If another player is present you may attack him (or her). The outcome of each 'round' is determined by who presses a key first and their present status — weapon skill, hit points remaining etc. A reasonable system but not exactly kind to your computer's numeric keys!

The game is a little difficult to get into with only a few locations accessible at the start. Location descriptions are brief and the exits vary slightly if the one player game has been chosen! There are a series of help messages but generally the text is a little thin.

CRL has a good reputation for software but The Causes of Chaos is below normal standard and is certainly not going to get into any top ten.

Last of a Line

Taskset has produced some good arcade games in the past few years and now this company has launched its first adventure Souls of Darkon. It is also the last game as Taskset has gone the way of many promising software houses and no longer exists but this game is still available.

Souls of Darkon is a text and graphics adventure which players will love or hate. Yes one of those! It has a fairly standard plot, where you, the hero, will hopefully free the world from its evil overlord Darkon. The world is the planet Megron, you are 'bionic' and are accompanied by a robot called Komputa!

There is a strange mixture of ancient and modern with anti-gravity belts as well as swords and maces. Make the most of what you can find, for there are plenty of things hidden in this game, over 15 possibly useful objects in the first 10 locations!

There is a text panel at the top of the screen that describes your immediate surroundings — but not what may be lying around for you to pick up. Below, the screen is split, with a hi-res two colour picture on the left and on the right a scrolling text window that displays the replies to your input commands.

Multi-word commands of the type 'ATTACK THE MAN WITH THE SWORD' are accepted but the vocabulary is limited. 'VOCAB' or 'V' will display a list of the verbs that are understood and this will often be scanned in the hope of finding the right word.

You are not always told what you might have unconvered, frequent use of 'LOOK' is to be recommended. 'HELP' is recognised by the parser and does not bring any immediate assistance but 'LEGEND' will produce various useful but cryptic messages.

Each step seems to involve a puzzle and you may feel that some of these are somewhat contrived. There are characters to meet but the vocabulary limits any great interaction! Definitely

not a game for the novice adventurer as progress is restricted to very few locations until a number of puzzles have been solved.

Communicate

Playing adventures may not be the most popular use for a home computer but it certainly has a following that is both large and growing. There are adventure columns in nearly every magazine and a growing number of independent, privately produced, dedicated adventure mags.

The independents are usually photocopied affairs crammed with news, views and reviews. You may think that with so many people all looking at the same source material that they would all be repeating the same things about the same games — not so. Each reviewer has his own ideas as to what makes a game a winner or a loser.

Some games stand out from the pack, while others fall by the wayside completely. Fortunately the latter are getting fewer. But although the appeal of adventures is widespread, not everybody likes to play the same type of game. The trick is to find the reviewer who has a similar taste to yourself.

Adventure columns should be as impartial as possible with a good reviewer having spent a fair time trying to solve the adventures he reviews. We are not super-heros, able to solve every game in just a few hours but we do have the experience of dozens of adventures to draw upon. The more you read, the more likely you are to be able to judge which games are for you.

One of the newer independents is 'Orcsbane', edited by Nick Walkland of 84 Kendal Road, Sheffield S6 4QH. A single issue is 50p or a year's subscription, £3.00. Our sample had some 36 pages of info, maps, letters and general burble — not bad for 50p.

The best known independent is probably that of the Adventurers Club Ltd, 64C Menelik Road, London NW2 3RH. This is a monthly 20 page dossier, costs £10.95 yearly and is a more professional set up linked with discounted software, a phone-in help line, competitions and various other offers. The Adventurers Club is run by dedicated adventurers, they know what you want and aim to supply it.

The less formal approach of these independent mags, tend to encourage a good response from readers but even here there is a delay between the writing of a question or answer and its publication. Phone-in help lines are one answer but an even more exciting development is becoming more and more popular with computer users — electronic mail, bulletin boards and special interest groups.

All these and more, are the outcome of linking your computer via a modem to many of the free networks set up around the country. Modems are becoming cheaper and often come with a list of phone numbers that will give you access to several of these bulletin boards.

There are many topics covered, ranging from where to eat to alternative medicine! Quite a few have adventure clues and/or the facility to leave messages requesting help. Another aspect of this form of communication is access to adventure games themselves, where the program can be downloaded directly into your own computer.

For some networks you have to pay a regular subscription but there are usually some features that make this worthwhile. Buy a Commodore modem and you will probably also get a limited free sub to Compunet. They offer all the usual bulletin board facilities plus much more.

There are even a number of well known games (Level Nine for instance), available for downloading from Compunet at less than the normal retail price. These have the added advantage of being disk based even if those in the shops were only on cassette. Having once got a modem there may even be the temptation to join in some real-time advetures with other modem users.

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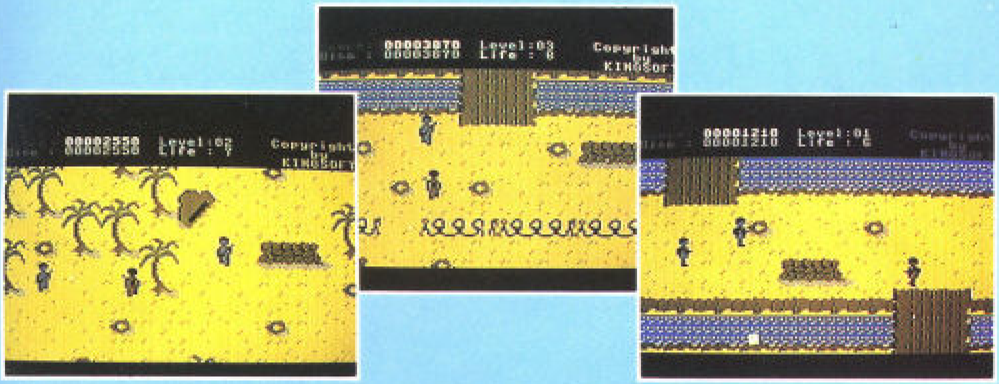
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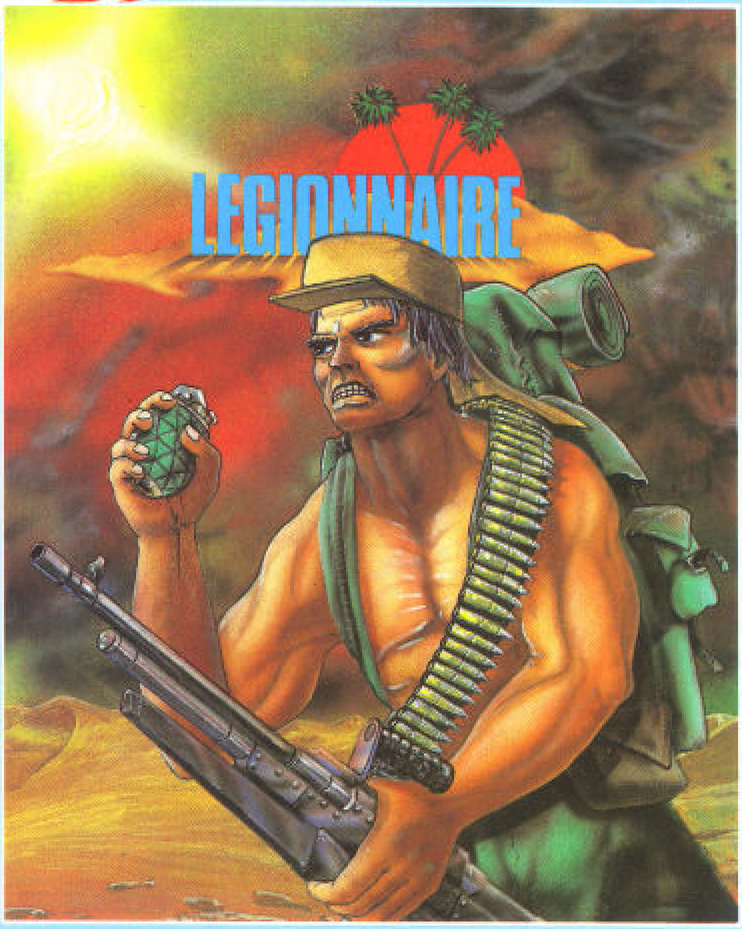
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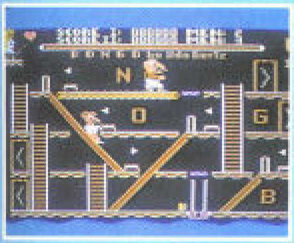


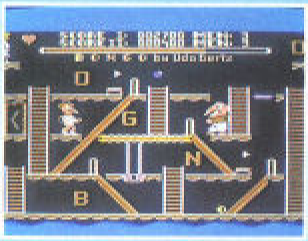


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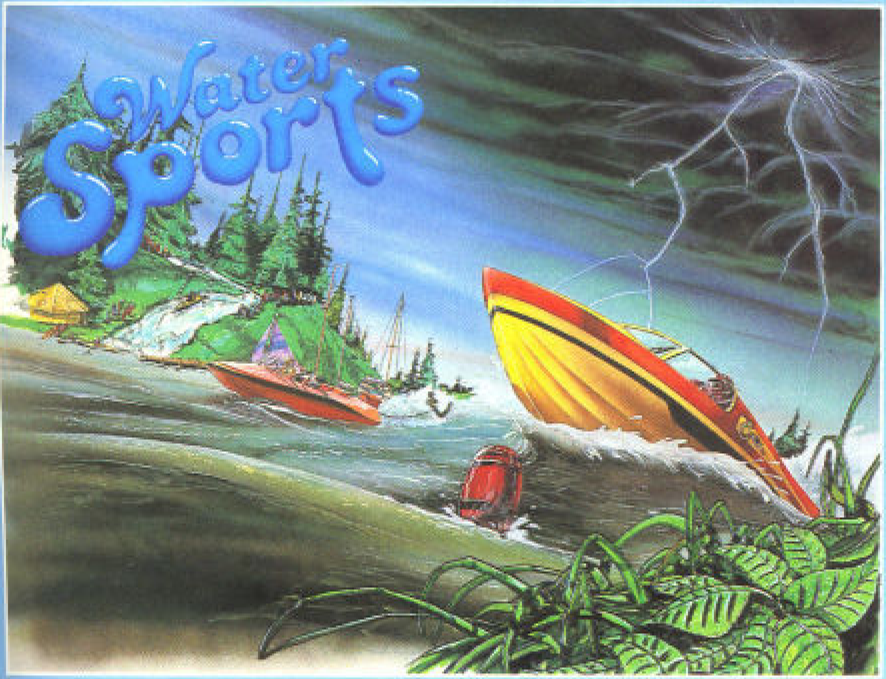
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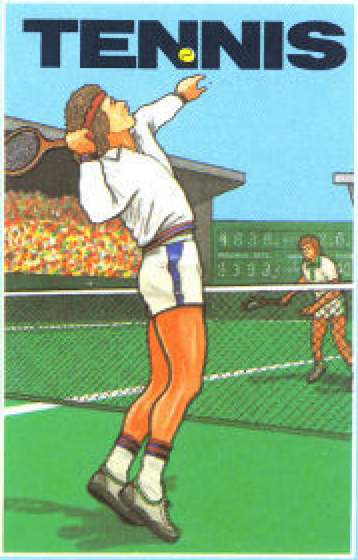
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Choosing the right computer is a good start — but can you find the right software?



At SUPERSOFT we're very conscious of the fact that people who spend several hundred pounds on computer equipment are looking to do rather more than play Space Invaders.

Financial planning is a rather grand name for something you've been doing all your life – making ends meet! Perhaps if Mr Micawber had used **BUSICALC** he would have been able to balance the books a little better.

For home, club or small business use BUSICALC 1 should pay for itself in no time at all; for larger companies we recommend BUSICALC 3, one of the few really valuable programs that you can learn to use in a day.

Although your Commodore 64 is a powerful musical instrument you need to be a pretty good programmer to understand how it all works. Unless, of course, you buy **MUSIC MASTER!**

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